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Entrepreneurial Activity and Options to Its Support through Public Policies

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Declaration

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no materials previously published or produced by another party in fulfilment, partial or otherwise, except where due acknowledgement is made in the text and except annexes, which were written in co-authorship.

Prague, 3.10.2017

Ing. Ondřej Dvouletý, MSc.

Entrepreneurial Activity and Options to Its Support through Public Policies

Abstract

The thesis consists of a series of peer-reviewed journal articles focused on entrepreneurial activity and entrepreneurship in the context of public policies. The research objectives of the studies include analysis of determinants of entrepreneurial activity on different levels (for group of Nordic countries and Czech regions), investigation of the impact of entrepreneurship on economic development of the Czech regions, and evaluation of the two Czech public programmes promoting entrepreneurship/self-employment. First case offers an aggregated evaluation of the self-employment programme for unemployed individuals and the second analysis demonstrates the impact of soft loans and credit guarantees on financial performance of the newly established enterprises. Individual research articles are associated in an introductory chapter, which aims to provide reader with a structured summary on the studied topic. Contribution of all above mentioned studies lies in the effort to collect empirical data and to create knowledge to help stakeholders and policy makers to form evidence driven policies promoting entrepreneurship and self-employment.

Podnikatelská aktivita a možnosti její podpory prostřednictvím veřejných politik

Abstrakt

Disertační práce je souborem recenzovaných článků věnovaných tématu podnikatelské aktivity a možnostem její podpory prostřednictvím veřejných politik. Práce se věnuje analýze determinantů podnikatelské aktivity (na příkladech nordických zemí a regionů České republiky), testování vlivu podnikatelské aktivity na ekonomický vývoj českých regionů a vyhodnocení dvou českých veřejných programů podpory podnikání. První analýza vyhodnocuje na regionální úrovni příspěvky poskytované nezaměstnaným za účelem založení samostatně výdělečně činné činnosti, a druhé empirické šetření analyzuje dopady podpory prostřednictvím finančních nástrojů (úvěrů a záruk) na finanční výkonnost nově založených podniků. Jednotlivé studie jsou pak sdruženy v úvodní kapitole, která čtenáři poskytuje ucelený přehled zkoumané problematiky, a která také shrnuje hlavní závěry jednotlivých studií. Výše uvedené studie empiricky přispívají k současnému poznání v oblasti veřejných politik podpory podnikání a zdůrazňují, že je třeba formulovat hospodářsko-politická opatření na základě empirických poznatků.

Klíčová slova: Podnikatelská aktivita, determinanty podnikání, ekonomický vývoj regionů, osoby samostatně výdělečně činné (OSVČ), vyhodnocení politik podpory podnikání

JEL klasifikace: M2, M1, L260

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Technical Preface

The presented doctoral dissertation thesis consists of a series of peer-reviewed journal articles focused on entrepreneurial activity and entrepreneurship in the context of public policies. Presented articles, which were written in solo-authorship, aim to deliver empirical evidence on the influence of entrepreneurship on economic growth, determinants of entrepreneurial activity and effects of public entrepreneurship and self-employment policies. Annex of the thesis further includes two additional articles related to the studied topic, which were written in co-authorship. Individual research articles are then associated in a following chapter 2, which aims to provide reader with a structured summary on the studied topic. This chapter presents also the key research findings from the journal articles which are placed in the main body of the thesis. Four out of five presented articles have been already published in scientific journals, and the fifth study is still under review. The fifth study is placed in the main body of the thesis, because it helps to maintain its logical structure.

The main part of the dissertation consists of the following five articles:

1. Dvouletý, O. (2017). Determinants of Nordic Entrepreneurship. *Journal of Small Business and Enterprise Development*, 24(1), 12-33. (Scopus) DOI: https://doi.org/10.1108/JSBED-07-2016-0104

2. Dvouletý, O. (2017). Can Policy Makers Count with Positive Impact of Entrepreneurship on Economic Development of the Czech Regions?. *Journal of Entrepreneurship in Emerging Economies*, 9(3), 286-299. (Scopus) DOI: https://doi.org/10.1108/JEEE-11-2016-0052

3. Dvouletý, O. (2017). Relationship between Unemployment and Entrepreneurship Dynamics in the Czech Regions: A Panel VAR Approach. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 65(3), 987-995. (Scopus) DOI: https://doi.org/10.11118/actaun201765030987

4. Dvouletý, O. (2017). Does the Self-employment Policy Reduce Unemployment and Increase Employment? Empirical Evidence from the Czech Regions. *Central*

European Journal of Public Policy, 2(11), in print (Scopus), accepted on 23.5.2017 DOI: 10.1515/cejpp-2016-0032

5. Dvouletý, O. Effects of Soft Loans and Credit Guarantees on the Performance of the Supported Companies: Evidence from the Czech Public Programme START, *International Journal of Emerging Markets* (Scopus), under review, second revision submitted on 4.9.2017

Annex consists of the following two articles:

1. Dvouletý, O., & Mareš, J. (2016). Determinants of Regional Entrepreneurial Activity in the Czech Republic. *Economic Studies & Analyses/Acta VSFS*, 10(1), 31-46. (ERIH) Available on: http://www.vsfs.cz/periodika/acta-2016-01.pdf
2. Dvouletý, O., & Lukeš, M. (2016). Review of Empirical Studies on Self-Employment out of Unemployment: Do Self-Employment Policies Make a Positive Impact?. *International Review of Entrepreneurship*, *14*(3), 361-376. (peer reviewed journal) Available on: http://www.senatehall.com/entrepreneurship?article=552

1. Introduction

Entrepreneurship as a scientific field is still relatively young and under-researched. Gartner (1985) stated that entrepreneurship is a multi-dimensional phenomenon which should be studied from different perspectives and with all its complexities. Entrepreneurship scholars have background from the variety of research fields, such as psychology, sociology, management and economics. Shane and Venkataraman (2000) on p. 219 frame entrepreneurship as a "process that involves the discovery, evaluation, and exploitation of opportunities to introduce new products, services, processes, ways of organizing, or markets." The growing interest in studying entrepreneurship originates in the positive influence of entrepreneurship on economic development. Researchers, public authorities and stakeholders see entrepreneurship as a source of new job opportunities and as a significant determinant of economic growth (Welter and Smallbone, 2011).

Positive contributions of entrepreneurship towards the growth of a country's gross domestic product (GDP) were highlighted by previous scholars in entrepreneurial studies (e.g. Thurik, 1995; Berkowitz and DeJong, 2005; Van Praag and Versloot, 2007 or Acs et al., 2016). However, not all researchers were in consensus with this statement. In opposition to positive outcomes of entrepreneurship was for example Baumol (1996) who argued, that entrepreneurship may not have only positive impact, but also zero or negative effect. Ambiguity of the relationship has also been reported by latter scientists (e. g. Blanchflower, 2000; Fritsch and Mueller 2004; 2008 or Fritsch, 2008). Bjørnskov and Foss (2016) have recently written a literature review on the empirical literature related to the impact of entrepreneurship on economic growth, and they surprisingly conclude, that we do not have much empirical evidence, and therefore we cannot automatically assume positive impact of entrepreneurship on economic development of particular countries. Therefore, this question may only be answered empirically on cases of specific countries, regions or cities. Koellinger and Thurik (2012) who encourage this approach, point out, that the relationship may vary over the time and across regions. This statement is also supported by other empirical scholars who further note that the positive contributions of entrepreneurship may even vary across

the types of entrepreneurial activity (e. g. Audretsch et al., 2015; Shaffer et al., 2015, Toma et al., 2014 or Floyd, 2014).

Therefore, it is not surprising that scientists, politicians and other stakeholders currently discuss, how to maximize positive outcomes of entrepreneurship in order to boost competitiveness and to keep sustainable economic growth (Welter and Smallbone, 2011). Motivation behind this research is to provide information value for the above mentioned audience with the usage of proper scientific methodology. My personal motivation originates in the relativistic approach to scientific research, which is based on the need to seek answers/solutions to the current problems in the economy/society (e. g. Chalk, 1967 or Loužek, 2009).

1.1. The Main Objective of the Dissertation

The specific research problems, which are discussed in this introductory chapter, aim to identify and to analyse determinants of entrepreneurship on different levels of analysis (e. g. group of countries, regions or cities), to investigate impact of entrepreneurship on the economic development, and to evaluate impacts of public policies promoting entrepreneurship/self-employment. **The main objective of the dissertation is to provide stakeholders an empirical evidence on the relationship between entrepreneurship and regional development, determinants of entrepreneurial activity and effects of public policies aiming to promote entrepreneurship/self-employment.** The hierarchical structure of the thesis is depicted on Figure 1 below. Several empirical investigations are conducted on different levels of analysis. They begin at the level of countries (macro level), then continue on regional level (meso level) and end up on firm level (micro level).

Figure 1: Hierarchical Structure of the Doctoral Dissertation Thesis – From Cross-Country Analysis to Effects of Specific Public Programme

Cross-Country Determinants of Entrepreneuship (Macro)

Impact of Entrepreneurship on Economic Development of Country or its Regions (Meso)

Determinants of Regional Entrepreneurial Activity (Meso)

Policy Evaluation on Regional Level (Meso)

Policy Evaluation on Individual Level (Micro)
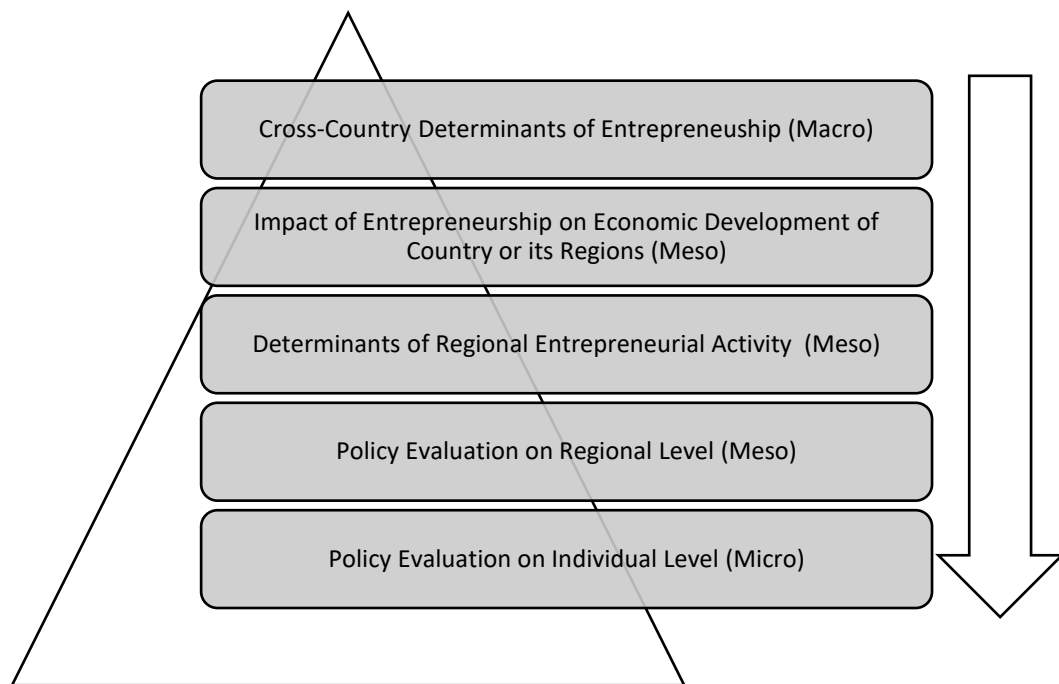
Source: Own Work based on Davidsson and Wiklund (2007)

1.1.1. Sub-goals

The main goal of the thesis is further divided into several sub-goals, which are stated below:

1. Analysis of the cross-country determinants of entrepreneurial activity on the example of Nordic countries with a focus on different measures of entrepreneurship at the country level

2. Analysis of the impact of entrepreneurship on economic development of the Czech regions

3. Analysis of determinants of entrepreneurial activity on the example of the Czech regions with a focus on the relationship between entrepreneurship and unemployment rate

4. Evaluation of the Czech public programme facilitating start-up subsidies to unemployed

5. Evaluation of the Czech public programme facilitating financial capital through financial instruments to newly established enterprises

1.1.2. Applied Methods

The accomplishment of each of the above-mentioned sub-goals requires the suitable methodological approach. Table 2 summarizes the level of analysis, time period, applied methods and similar/reference study for each of the sub-goals.

Table 1: Level of analysis, time period, applied methods and similar/reference study for each of the sub-goals

No.	Sub-goal	Level of analysis	Time period	Applied methods	Similar study
1	Analysis of the cross-country determinants of entrepreneurial activity on the example of Nordic countries with a focus on different measures of entrepreneurship at the country level	Nordic countries (Macro)	2004-2013	Panel regression analysis	Carbonara et al. (2016
2	Analysis of the impact of entrepreneurship on economic development of the Czech regions	Czech regions (Meso)	2003-2015	Panel regression analysis	Carree and Thurik (2008)
3	Analysis of determinants of entrepreneurial activity on the example of the Czech regions with a focus on the relationship between entrepreneurship and unemployment rate	Czech regions (Meso)	2003-2014	Panel vector autoregressive analysis	Koellinger and Thurik (2012)
4	Evaluation of the Czech public programme facilitating start-up subsidies to unemployed	Czech regions (Meso)	2012-2015	Panel regression analysis	Calmfors (1994)
5	Evaluation of the Czech public programme facilitating financial capital through financial instruments to newly established enterprises	Firm level (Micro)	2011-2014	Counterfactual analysis	Oh et al. (2009)

Source: Own elaboration

1.1.3. Thesis Structure

The thesis begins with the following chapter 2, which aims to provide reader with a structured summary on the studied topic, obtained findings and it contains several implications for both policy makers and research community. In the following parts of the

thesis (Chapters 3-7), there are placed five research articles which were written in solo-authorship.

Chapter 3 is dedicated to the discussion on the cross-country determinants of entrepreneurial activity and on the example of Nordic countries. The study empirically demonstrates that, when we use different operationalisations of entrepreneurship, we might end-up with similarity in empirical results (sub-goal 1, chapter 3). The recent study by Carbonara et al. (2016) served as an inspiration for conducting this study. The chapter 4 continues with the debate on the relationship between regional economic development and newly established entrepreneurial activity which was many times discussed by previous scholars and empirically studied for instance by Carree and Thurik (2008). Empirical results are shown on the example of the Czech regions (sub-goal 2, chapter 4). After that, chapter 5 presents the findings on the dynamics of the relationship between entrepreneurship and unemployment rate in the Czech regions. This relationship is theoretically justified by the theory of necessity entrepreneurship (sub-goal 3, chapter 5) and empirical part of the study was inspired by the work of Koellinger and Thurik (2012). The empirical assessment of the two Czech public programmes supporting entrepreneurship concludes the thesis. Chapter 6 offers an aggregated evaluation of the self-employment programme for unemployed individuals (sub-goal 4, chapter 6), for a similar study, see for instance work of Calmfors (1994). Finally, chapter 7 shows the impact of soft loans and credit guarantees on the performance of newly established enterprises (sub-goal 5, chapter 7 as it was analysed for instance by Oh et al. (2009).

2. Entrepreneurial Activity and Options to Its Support through Public Policies [1]

This chapter aims to provide reader with a structured summary on the studied topic, obtained findings and it contains several implications for both policy makers and research community.

2.1. Determinants of Entrepreneurship

Studying determinants of entrepreneurial activity on the micro (firm or individual), meso (industry or region) or macro (country or group of countries) level provides stakeholders information on factors that encourage and discourage entrepreneurship (Davidsson and Wiklund, 2007). The objective of the dissertation is in its nature more policy-related and therefore it is more linked to meso and macro levels of analysis. However for the sake of comprehensiveness, I discuss also individual predictors of entrepreneurial activity, despite the fact, they are not studied empirically.

A very comprehensive literature review on factors that influence the individual decision to become entrepreneur has been recently elaborated by Simoes et al. (2016). Generally, the factors could be classified into several categories. First category refers to objective individual attributes and demographic characteristics. This category consist of factors such as age, gender and education. Empirical evidence documents well an inverse U-shaped relationship between age and propensity to become entrepreneur. When it comes to the gender, women are less likely to become entrepreneurs. Nevertheless, the role of education is ambiguous. Theoretically, it is presumed that individuals with higher levels of

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[1] Please note that several parts of this introductory chapter were used from my articles presented in the main body of the thesis. For more details (e. g. limitations, discussion, policy recommendations and suggestions for future research), see the articles.

human capital have a higher propensity of becoming entrepreneurs, however, there is an empirical evidence of both positive and negative impacts of education (Brockhaus, 1980; Blanchflower and Meyer, 1994; Brandstätter, 2011 or Lukeš and Zouhar, 2013). The second category involves psychological factors that are associated with entrepreneurial activity such as motivation, self-efficacy, need for achievement, locus of control, job security and risk tolerance. The higher odds of becoming self-employed are presumed to be for individuals with higher self-efficacy, higher risk acceptance rate and with stronger abilities to act, when it comes to making decisions (Brandstätter, 2011; Lukeš and Zouhar, 2013 or Holienka et al., 2016). The third category gained much attention in the last years and it deals with the intergenerational transmission of entrepreneurship career. Empirical results consistently show that having parents with entrepreneurship experience can be stated to be a decisive predictor for the children's' own career decisions (Dunn and Holtz-Eakin, 2000 or Bosma et al. 2012).

One of the first empirical studies focused on the determinants of entrepreneurship on meso/regional level was written by Karlsson et al. (1993), who mention that entrepreneurs are closely related to their surroundings, reflected by the socio, economic and cultural variables. The market model is focussed on demand characteristics, market conditions, marketing and the establishment of networks. The market model was operationalized mainly through population density and GDP per capita. The second suggested model is the resource model, reflecting the resource-based view (RBV) on entrepreneurship, stating that the more resources individuals have the more probably they engage into entrepreneurial activity (Coleman, 1988). Quantification of the resource model's variables was done by Karlsson et al. (1993) mainly through the proportion of families having a house, share of population with a tertiary education, public expenditures for regional development and regional industry support. The milieu model tries to cover the socioeconomic variability, creativity and investments in leisure and culture. The main important variables were share of population employed in artistic professions, location of universities, cultural institutions and share of foreigners. The fourth model was the career model, depicting the situation in the labour market, as well as sociobiological and sociocultural factors. The most important variables of

the career model were unemployment rate, proportion of employees in manufacturing industry, ratio between existing businessmen and households and share of employees in small firms. According to their research, the distribution of enterprises is influenced by the variables categorized into the four models: market, resource, milieu and career model.

The resource-based view (RBV) on entrepreneurship states that the more resources individuals have the more probably they engage into entrepreneurial activity (Coleman, 1988). Grilo and Thurik (2004) divide the determinants of entrepreneurship into the supply and demand side. The supply side is determined by the population's characteristics, such as size, growth, age and education structure, population density and share of immigrants. The economic development, globalization and the stage of technological development are considered as for the demand side of entrepreneurship. The quality of business, governmental and cultural environments affect the level of entrepreneurial activity, as previously described by entrepreneurship scholars using the theory of institutions (e.g. Bruton et al., 2010) introduced by North (1990). North (1990) explains that formal instructions aim to reduce transaction costs, contrary to informal institutions which decrease uncertainty in the society. According to previous research, both formal (e.g. regulations, procedures, start-up costs, procedures needed to set up an enterprise, access to credit, taxes) and informal (e.g. culture, corruption perceptions, attitudes towards entrepreneurs, entrepreneurship perceptions) institutions have influence on entrepreneurship. A bad environment and institutions may therefore discourage entrepreneurship; however, a good environment and institutions may encourage entrepreneurship (e.g. Aparicio et al., 2016; Bjørnskov and Foss, 2013; Nissan et al., 2011; Van Stel et al., 2007).

Negative impact of administrative barriers, expressed as start-up costs or amount of procedures required to establish an enterprise, has been empirically supported by several entrepreneurial scholars (e.g. Aparicio et al., 2016; Freytag and Thurik, 2007; Grilo and Thurik, 2004). A more difficult task is to operationalize informal institutions, as well as cultural and social norms. Previous research suggests to take into account proxy variables, such as life expectancy indices, expenditures on health, expenditures on culture, social

spending or business and economic freedom indices (e.g. Giannetti and Simonov, 2004; Freytag and Thurik, 2007).

Dvouletý and Lukeš (2016) further discuss the importance of entrepreneurship policies. Policies focused on self-employed may lead towards higher levels of entrepreneurial activity; however, policies focused on high-growth enterprises may result in even higher economic growth and new job opportunities (Shane, 2007). A less direct approach of how to support entrepreneurship is through expenditures on R&D sector. According to Sanders (2007) or Aidis et al. (2008), investments into R&D create scientific knowledge and the new technological advancements of applied science bring new business opportunities that are further exploited by entrepreneurs and delivered to the market. Once the opportunities are exploited and commercialized, entrepreneurial activity increases. The R&D sector may also be operationalized through the rate of R&D institutions per capita (Dvouletý and Mareš, 2016a). Roig-Tierno et al. (2015) consider for the support infrastructure incubators, technology centres, and universities. Regarding their research, supportive infrastructure has the highest impact on innovative entrepreneurship. The aim of these institutions is to boost innovative activity and commercialize it as a product or service. The business sector has therefore interest in establishment of networks with these R&D institutions, which act within each other complementarily.

The theoretical approach explaining different responses of actors towards regional economic development, classifies entrepreneurs into the two categories: necessity-driven entrepreneurs and opportunity-driven entrepreneurs. Reynolds et al. (2005) call by necessity entrepreneurs formerly unemployed individuals who become entrepreneurs because they do not have any better alternative job opportunities. On the opposite, opportunity-driven entrepreneurs discover new business opportunities, bring innovation and strive for long-term sustainability of their businesses, high growth and future profits, when compared to their current employment opportunities. Necessity and opportunity-driven entrepreneurs differ, according to previous researchers, in several factors such as duration of entrepreneurship, job satisfaction, level of human capital and growth aspirations (e.g. Aparicio et al., 2016;

Acs and Varga, 2005; Block and Sandner, 2009; Block and Koellinger, 2009). Since both forms of entrepreneurship are present in real economies, one needs to empirically observe, which form exceeds.

Associations among the variables are usually empirically tested by econometric methods, concretely by regression analysis (e. g. Wennekers et al., 2005). The independent variables represent the drivers/determinants of entrepreneurship and the right side of the regression equation operationalizes entrepreneurial activity. However, one needs to admit, that there exists no common approach how to quantify entrepreneurial activity. In empirical practice, there are several ways how to operationalize entrepreneurship and scholars use all of them (e. g. Congregado, 2007). Wennekers et al. (2005) work with the established business ownership rate obtained from the Global Entrepreneurship Monitor (GEM, 2016), Congregado (2007) discusses usage of self-employment rates from Eurostat Labour Force Survey or OECD database, Koellinger and Thurik (2012) work with the rate of registered businesses per capita, and finally Fritsch et al. (2015) use new business registrations per economically active population. Therefore I have decided to use two ways how to operationalize entrepreneurship on the example of Nordic region, and to investigate determinants of entrepreneurial activity with usage of econometric models.

2.1.1. Case of Nordic Region – Chapter 2

Nordic "welfare states (Denmark, Finland, Iceland, Norway and Sweden)" are commonly distinguished from the rest of the world through the high share of the public sector, well-developed social security systems and high levels of social solidarity with a strong focus on social parity and equality of opportunities (e.g. Hjorth, 2008; Svallfors, 2003; Ahl et al., 2016). Nordic countries have their specificities not only from the view of historical and sociocultural aspects, but also from the perspective of entrepreneurship and its research (Kuckertz et al., 2015). The Nordic region reports on average lower rates of entrepreneurial intentions, lower rates of early stage entrepreneurial activity and even lower rates of established entrepreneurial activity in comparison with European and American countries (Gatewood et al., 2014). According to the Global Entrepreneurship Monitor (GEM) (2016)

on average 6.6 per cent of the Nordic population was engaged in entrepreneurship during the period of years 2004-2013. Most people start a business entity in their 30s and only very few of them engage in entrepreneurship while they are young (e.g. Shneor et al., 2016; Vogel, 2003). The low presence of young entrepreneurs may be, according to Nordic researchers, caused by the lack entrepreneurial capabilities, business skills and lack of funding. Nordic countries are also often described as having low-risk acceptance rates. Significant influence on entrepreneurial activity comes also from the state-governed regulations and administrative barriers (e.g. Bulanova et al., 2016; Shneor et al., 2016).

The specificities of Nordic entrepreneurial research, potential diversity in the impact of traditional entrepreneurial determinants and the perceived need to study Nordic region as an entrepreneurial ecosystem have become the motivation for this research. The purpose of this study is to investigate the determinants of entrepreneurial activity in the Nordic countries during the period of 2004-2013. The main emphasis is put on the response of the population of active enterprises to the economic development of the Nordic region to see whether the theories of necessity- and opportunity-driven entrepreneurship may be applied also for the Nordic countries. Based on previous research, the positive impact of an increase in GDP (bringing new opportunities) and the positive impact of unemployment (giving the unemployed an alternative way to earn a living via self-employment) are assumed (e.g. Aparicio et al., 2016; Carree and Thurik, 2010). The role of formal institutions is investigated, where the main research interest is to quantify the association between administrative (business) barriers and entrepreneurial engagement. Previous studies (e.g. Freytag and Thurik, 2007; Grilo and Thurik, 2004) assume a negative and discouraging effect of the amount of administrative barriers and procedures required to establish a business on entrepreneurial activity. Another important representation of formal institutions in the research is influence of the R&D sector, promising new business opportunities originating from the creation of new scientific knowledge (Sanders, 2007), answering concern related to the role of the R&D sector in the Nordic region recently raised by Fagerberg and Fosaas (2014).

Nordic entrepreneurial activity was quantified by the two variables, rate of registered business activity and established business ownership rate, to mitigate potential biases caused by operationalization of entrepreneurship through the registered business activity. Data were obtained from the various databases and were formed into a panel data set. For each entrepreneurial activity, acting as the dependent variable, was estimated a set of econometric models following the fixed effects estimator approach. For the main explanatory variables, unemployment rate, administrative barriers and GDP per capita were tested including with relationships with up to a two-year lag to analyse the long-run impacts on Nordic entrepreneurship.

The results obtained for both dependent variables did not substantially differ from each other and were generally in agreement with the previous entrepreneurial research. This empirical finding serves for a methodological contribution of this study. The hypothesis stating that there was a positive relationship between unemployment rate and entrepreneurial activity during the analysed period was supported and also consistent with previous empirical studies (e.g. Koellinger and Thurik, 2012; Fritsch et al., 2015; Dvouletý and Mareš, 2016a, c). The statistically significant negative impact of administrative barriers, acting as discouraging formal institutions, on entrepreneurial activity was also expected, according to reported findings by other scholars (e.g. Aparicio et al., 2016; Freytag and Thurik, 2007; Grilo and Thurik, 2004). The third tested hypothesis assuming a positive relationship between GDP per capita and entrepreneurial activity was also confirmed and the obtained results were consistent with the previous research studies assuming existence of opportunity-driven entrepreneurship (e.g. Albulescu and Tămăşilă, 2016; Koellinger and Thurik, 2012; Dvouletý and Mareš, 2016b). Contrary to previous researchers such as Roig-Tierno et al. (2015), no empirical evidence was obtained to support the hypothesis assuming a positive relationship between the R&D sector and entrepreneurial activity.

Upcoming Nordic entrepreneurial research should continue in studying entrepreneurial activity from the aggregated perspective with employment of quantitative methods. Evaluation of the impact of additional control variables representing determinants

of entrepreneurship to support the presented findings could be one research challenge. Investigation of entrepreneurial activity on the lower, regional administrative levels could also be a way how to contribute towards Nordic entrepreneurial knowledge. Another suggestion for future researchers is to take into account different forms of entrepreneurship, such as business companies and self-employed and to study them separately, since both have their own specificities (e.g. Shaffer et al., 2015). For more details (e. g. limitations, discussion, policy recommendations and suggestions for future research), see the whole article entitled "Determinants of Nordic Entrepreneurship" in chapter 3. Analysis of the determinants of entrepreneurial activity in the Czech regions can be found in annex 1.

2.2. Entrepreneurship and Regional Economic Development

In the previous section, I have shown that it is possible and relevant to study determinants of entrepreneurial activity on the example of Nordic countries. However if we want to know, what are the contributions of entrepreneurship to economic development of one particular country – we must lower down the level of analysis on the level of one country or its regions. This kind of empirical analysis has the advantage of relatively constant institutional and business environment.

I have previously mentioned that the positive contributions of entrepreneurship may vary over time and even across the types of entrepreneurial activity (e. g. Audretsch et al., 2015; Shaffer et al., 2015, Toma et al., 2014 or Floyd, 2014). Bjørnskov and Foss (2016) have recently written a literature review on the empirical literature related to the impact of entrepreneurship on economic growth, and they surprisingly conclude, that we do not have much empirical evidence, and therefore we cannot automatically assume positive impact of entrepreneurship on economic development of particular countries.

Baum et al. (2014) believe that entrepreneurship identifies inefficiencies in economies and mitigates those through the process of exploitation of opportunities. Rationality behind this process can be according to Burns (2010) summarized by the three reasons; generation of variety, diversity and originality, spread of (new) knowledge across individuals and organizations, and increase in competition caused by overall increase in entrepreneurial activity. Researchers highlight the innovativeness most frequently (e. g. Wennekers and Thurik, 1999; Thurik, 2009; Lukeš, 2013 or Toma et al., 2014). Higher entrepreneurial activity in the region may lead to increase in productivity, higher employment, growth of individual incomes and it may result in increased economic growth and higher level of GDP per capita (e. g. Van Stel and Storey, 2004; Shane, 2007; Craig et al., 2007 or Van Praag and Versloot, 2007).

Nevertheless, not every newly established enterprise acts as a unicorn firm, which usually creates new jobs and experiences rocket economic growth. Commonly used rate of self-employment in formerly published empirical studies (e. g. Carree et al. 2015 or Van Praag and Van Stel, 2013) may often include individuals, who perceive self-employment as an alternative option to wage employment. Increase in self-employment hence does not always have to lead to economic boost and creation of new jobs (Shane, 2009). However self-employment can result in reduction of unemployment, since some unemployed individuals perceive entrepreneurship as a way how to earn income till the moment, when the conditions on labour market improve (e. g. Dvouletý, 2017b; Dvouletý and Lukeš, 2016 or Dvouletý and Mareš, 2016b). Boost in regional economic growth would be expected more from dynamic and innovative SMEs, business companies and partnerships, and therefore one needs to distinguish among several forms of entrepreneurship and to empirically test their impact on regional economic development (e. g. Audretsch et al., 2015; Brekke, 2015 or Shaffer et al., 2015). Therefore I have decided to use two ways how to operationalize entrepreneurship (rate of newly established self-employed and rate of newly established business companies) on the example of the Czech NUTS 3 regions, and to investigate impact of both forms of entrepreneurship on economic development, with usage of econometric models.

2.2.1. Case of the Czech Regions – Chapter 3

Empirical evidence in the Czech Republic, related to the impact of entrepreneurship on regional development, is still relatively scarce, despite the fact that entrepreneurship is there perceived as a source of competitive advantage (Polok et al., 2016 or Welter and Smallbone, 2011). Once studying interregional differences and disparities in the Czech Republic, scholars stress the role of entrepreneurship (e. g. Dvouletý, 2017b; Šebestová et al., 2015; Baštová et al., 2011; Kutscherauer et al.; 2010 or Martinčík, 2008), however the more rigorous approach, testing the impact of entrepreneurship on regional economic development, is still missing. According to the national Global Entrepreneurship Monitor team (Lukeš et al., 2014), 5.3% of economically active population in the Czech Republic had in 2013 established enterprise and 7.3% established new business entity. Key identified variables are according to authors in the Czech regional economic development: GDP per capita, growth of GDP, average gross wage, income, unemployment rate, entrepreneurial activity, population density, demographical trend, traffic infrastructure, educational, age and labour structure of inhabitants, presence of universities and research centres (e. g. Zimmermannová et al., 2016; Šebestová et al., 2015; Baštová et al., 2011, Kutscherauer et al., 2010; Damborský and Wokoun, 2010; Martinčík, 2008; Paul Dana, 2000). Impact of cohesion policies also needs to be discussed (Blažková, 2016; Edoho, 2016; Dvouletý and Lukeš, 2016 or Kolařík et al., 2014) and the role of foreign direct investments (Damborský and Wokoun, 2010). Presented studies are in consensus that variables should be expressed per capita or per thousand of inhabitants and scholars stress the importance of recalculating variables denominated in financial units into real values, adjusting them from inflation.

Economic development of the thirteen Czech NUTS 3 regions was operationalized by the real GDP per capita and unemployment rate. Four hypotheses investigating the relationship between the both forms of new entrepreneurial activity and the regional economic development of the Czech regions are stated and econometrically tested. Tested hypotheses assume increase in regional GDP per capita and decrease in regional unemployment rate for both forms of entrepreneurship. The empirical regression analysis

was used for the analysis of the relationship over the period of years 2003-2015. Data were collected from the Czech Statistical Office, Industrial Property Office and Eurostat Database. Capital Praha was identified as an outlier and it was excluded from the empirical analysis. Econometric models with fixed effects were estimated to evaluate the stated hypotheses.

Econometric approach revealed that both forms of newly established entrepreneurial activity were associated with lower unemployment rates in the Czech NUTS 3 regions, which can be perceived as an interesting delivery and supportive evidence for the Czech entrepreneurship policy makers. Support of entrepreneurship in the Czech regions may therefore improve situation on the local labour markets and it may deliver new job opportunities through the newly established enterprises (Dvouletý, 2017b). However, according to the obtained results, the impact of newly established business companies was significantly higher, compared to the impact of the newly established self-employed. Different outcomes of newly established business companies and self-employed were obtained also in the regression models investigating the effect of new entrepreneurial activity on the real GDP per capita. Only the higher rates of newly established business companies and partnerships were associated with higher levels of GDP per capita in the Czech regions and no impact was found for the rate of newly established self-employed. The Czech entrepreneurship policies focused on the growth of GDP and economic boom should hence be oriented more on the support of high growth enterprises (unicorns) delivering new job opportunities as Shane (2009) already pointed out. However if the main aim of the Czech regional policy makers is to improve the labour market conditions and to decrease unemployment rates, then the support of both forms of entrepreneurial activity may be an alternative option, fulfilling this task (Dvouletý and Lukeš, 2016). Tools to achieve higher level of new entrepreneurial activity should combine organization of entrepreneurial trainings, workshops and the good system of supportive infrastructure, linking services of technology centres, business incubators and science parks. Much more efforts also need to be put into reduction of bureaucracy and administrative barriers of business entry. Regional entrepreneurial ecosystem coordinating work of public sector authorities, research institutions and entrepreneurial stakeholders needs to be improved. Simpler and efficient

entrepreneurial ecosystem may be a source of competitive advantage and result in higher economic growth and lower unemployment (Dvouletý and Mareš, 2016a; 2016b).

Presented results definitely support arguments of the previous entrepreneurship scholars highlighting the differences across the forms of entrepreneurial activity and their impacts (e. g. Audretsch et al., 2015 or Shaffer et al., 2015). Future researchers should address specificities of self-employment and business companies and partnerships, when conducting empirical analysis and to test, whether their impact on economic performance and employment differs. Upcoming research should also address entrepreneurial activity in the Central and Eastern European region, where entrepreneurial knowledge is still relatively scarce. Another challenge for future research is to conduct dynamic analysis of the relationships, which could be estimated on the longer time series, which are currently not available. With more detailed data, it would be interesting to broaden the horizon of analysis not only on the level of regions, but also on the level of districts or cities. For more details (e. g. limitations, discussion, policy recommendations and suggestions for future research), see the whole article entitled "Can Policy Makers Count with Positive Impact of Entrepreneurship on Economic Development of the Czech Regions?" in chapter 4.

2.3. *Relationship between Entrepreneurship and Unemployment*

Previous study has confirmed, that increase in both forms of entrepreneurial activity has negative impact on unemployment rate in the Czech Republic. If we go back to the study investigating determinants of entrepreneurship, it might be interesting to see, what the dynamics of the relationship between unemployment and entrepreneurship in the Czech Republic is. Scientific debate regarding the relationship between unemployment and entrepreneurship is, despite the recent increase in the amount of published studies (Dvouletý

and Mareš, 2016a, Cueto et al., 2015, Klapper et al., 2015 or Fritsch et al., 2015) not conclusive.

Ambiguity of the relationship between unemployment and entrepreneurship is commonly explained by the researchers in the following way, discussing two effects acting against each other. Decline in the economic growth and fall of the economy into the recession are usually associated with the higher level of unemployment rate and decrease in salaries due to the overall drop of aggregated demand, which finally results in the decrease of entrepreneurial activity (Dvouletý, 2017; Grilo and Thurik, 2004, Carree and Thurik, 2010). At the same time, decrease in salaries and wages lowers the opportunity costs for business start-up, especially for unemployed individuals, whose opportunity costs are benefits (unemployment spells) collected during the stay in unemployment. That makes from unemployed people an important source of potential entrepreneurs, since unemployment benefits are lower than the expected payoff from engagement in entrepreneurship (Parker, 2009, Congregado et al., 2009). Since unemployed do not have better alternative opportunities, this kind of entrepreneurship is associated with the term necessity entrepreneurship, providing unemployed an opportunity to earn money for living, till better alternative opportunities reveal on the labour market (Carree and Thurik, 2010). Hence the total amount of newly created enterprises may exceed the number of businesses closed due to recession and result in the higher level of entrepreneurial activity. However once the economic performance turns into an economic growth, necessity entrepreneurs may withdraw from entrepreneurial activity because of the better alternative opportunities on the labour market and overall entrepreneurial activity may even decrease (Llopis et al., 2015, Fotopoulos, 2014, Koellinger and Thurik, 2012).

Baptista and Thurik (2007) point out that this relationship may vary over time and across countries and needs to be empirically investigated econometrically. Potential outcomes should be monitored with up to the two year lags. Positive, pro-cyclical relationship between unemployment and entrepreneurship has been obtained recently by

Fritsch et al. (2015). Nevertheless, Cueto et al. (2015) note that the positive effect on entrepreneurial activity occurs only when unemployment rate increases substantially.

2.3.1. Case of the Czech Regions – Chapter 4

One of the first empirical investigations of the relationship in the Czech context was conducted by Menčlová (2014) who used bivariate correlation analysis between entrepreneurship and unemployment, and she analysed the period of years 1992-2011. Menčlová (2014) obtained negative correlation coefficient for joint-stock companies and companies with limited liabilities, however she reported no statistically significant impact of economic recession during the years 2008-2010. More robust econometric approach was applied by Hájek et al. (2015) who analysed the Czech micro-regions during the period of years 2011-2012. Hájek et al. (2015) estimated regression models with parameters lagged up to two years, however they were unable to find any statistically significant impact of unemployment on entrepreneurial activity. Different result was obtained by Dvouletý and Mareš (2016b) who analysed the impact of unemployment rate on entrepreneurial activity using annual data for the NUTS 3 regions for the period of years 1995-2013 and who obtained statistically significant, positive influence. This contradictory finding may be caused by the length of the analysed period. Another reason could be the fact that Hájek et al. (2015) did not expressed entrepreneurial activity per capita, but only in absolute numbers.

To shed more light on the dynamics of the relationship between entrepreneurship and unemployment in the Czech context, I apply methodological approach of Koellinger and Thurik (2012) and I empirically estimate vector autoregressive (VAR) models with impulse response function with the purpose to analyse the dynamics of the relationship. My tested hypothesis assumes a positive relationship between dynamics of unemployment rate and entrepreneurial activity during the period of years 2003-2014. Obtained data come from the Czech Statistical Office (CZSO, 2016) and cover the 14 Czech NUTS 3 regions quarterly from the first quarter of 2003 (2003Q1) to the last quarter of 2014 (2014Q4). Collected dataset consists of 672 observations for each of the two variables, total amount of registered businesses in the region at the end of quarter and unemployment rate.

Estimated impulse response function, from the VAR model, shows that two years after the unemployment shock, the growth in the amount of new enterprises exceeds the shutdown of established enterprises and results in the higher level of entrepreneurial activity compared to its initial state, which is a supportive argument for the stated hypothesis assuming a positive relationship between unemployment and entrepreneurship dynamics during the analysed period of years 2003-2014. Obtained findings are also in consensus with the results reported previously by Dvouletý and Mareš (2016b). However it looks like that the positive response of entrepreneurship dynamics is not that fast and that it takes about two years for entrepreneurial activity to grow above its initial level after the increase in unemployment rate.

Entrepreneurship policy makers should discuss the alternative to support individuals struggling with an engagement into entrepreneurship, particularly prepare set of actions, guiding potential entrepreneurs through the process of business start-up and therefore speed up the process of founding enterprises which could lead to acceleration of the total increase in entrepreneurial activity with all its positive externalities. Importance of the need to focus entrepreneurship policies on unemployed has already been pointed out by the previous researchers (e. g. Lukeš et al., 2014, Dvouletý and Lukeš, 2016 or Dvouletý and Mareš, 2016b), who suggest to support entrepreneurship through the organization of trainings, workshops and allocation of the resources towards entrepreneurial infrastructure (e. g. science parks and business incubators).

Other initiatives supporting monitoring of entrepreneurial activity on the regional level, such as Global Entrepreneurship Monitor (GEM), are needed for robustness check of obtained results. One extension on the presented article perceived as a challenge for future research is to estimate separate econometric models for different forms of entrepreneurial activity, e. g. self-employment and business companies and to investigate their dynamics with the business cycle (Dvouletý and Mareš, 2016c). Future research in the Czech Republic needs to also address the impacts of entrepreneurship policies and to evaluate their effectivity and influence on the new business formation (Dvouletý and Lukeš, 2016; Mirošník et al.,

2016 or Blažková, 2016). For more details (e. g. limitations, discussion, policy recommendations and suggestions for future research), see the whole article entitled: Relationship between "Unemployment and Entrepreneurship Dynamics in the Czech Regions: A Panel VAR Approach" in chapter 5.

2.4. Self-employment out of Unemployment

Conclusions derived from the previous studies have motivated me to empirically assess two Czech public programmes to see, whether the entrepreneurship/self-employment policies have positive impact. The first analysis is related to the empirical investigation of effects of self-employment subsidy for unemployed in the Czech NUTS 3 regions for the period of years 2012-2015 to provide policy makers a supportive material useful for policy adjustments. Connection among the self-employment, entrepreneurship policies/active labour market policies (ALMP) and unemployment rate is established through the theory of necessity entrepreneurship. Necessity entrepreneurship provides an alternative choice for those individuals who were unable to get better alternative opportunity on the labour market and therefore they do not have to end up in unemployment. Self-employment serves then as a way out of unemployment. (e. g. Fritsch et al., 2015, Bosma and Harding, 2006 or Reynolds et al., 2005). The dynamics of the relationship between entrepreneurship and unemployment was introduced before.

The idea behind the self-employment programmes is to engage unemployed individuals to join entrepreneurial activity and to support their efforts, because participation in any economic activity helps unemployed to maintain their working habits, skills and to increase their work experience. Self-employment then prevents formerly unemployed from falling into the long-term unemployment, which may result in social exclusion and poverty. Public support commonly includes non-repayable capital grants, counselling and

entrepreneurial trainings. The most important outcome from the angle of public authorities is the reduction of unemployment. Effectivity of the programmes may nevertheless differ over time and across the regional conditions and therefore each of the programmes needs to be assessed with respect to the local conditions. Evaluations are commonly conducted on the level of state, region or individual, whereas the assessments on individual level allow to take into account individual characteristics and analyse outcomes of the programme not only on employment status, but also on the size of income (e. g. Dvouletý and Lukeš, 2016; Wolff et al., 2016; Audretsch et al., 2015; Soukup, 2011 or Caliendo and Kritikos, 2010). Unfortunately, to collect data on individual level requires strong cooperation between the researchers and public authorities, which is not always successful.

Evaluation of the self-employment programmes is a challenging topic investigated by entrepreneurial scholars and labour economists all over the world. Recently published studies (e. g. Acs et al., 2016; Caliendo et al., 2016; Wolff et al., 2016; Fritsch et al., 2015, Klapper et al., 2015; Zouhar and Lukeš, 2015 or Zouhar et al., 2015) which analyse the impact of self-employment programmes, as a part of active labour market policies on individual, regional or country level, indicate that the impacts of entrepreneurship policies are not fully conclusive and require further research attention. Dvouletý and Lukeš (2016) in their literature review focused on self-employment out of unemployment, summarized empirical approach, level of analysis, variables and empirical findings of the studies published in the past ten years and conclude that if the main aim of self-employment policies is to reduce unemployment, then the policies fulfil this goal. However they further point out that it is necessary to conduct empirical studies assessing the outcomes of different programmes and compare them within each other, since the results may differ not only geographically but also over the time periods.

2.4.1. Start-up Subsidy Programme for Unemployed in the Czech Republic – Chapter 5

Self-employment subsidy for unemployed has been used in the Czech Republic as a part of active labour market policy since 2004. Unemployed individuals may ask for a subsidy to establish socially beneficial business[2] and to receive a financial support equal to a maximum of six average monthly wages if the unemployment rate in the region is equal or higher to the national unemployment rate. If the regional unemployment is lower than national unemployment rate, then the maximum amount of subsidy is equal to the four average monthly wages. If the new entrepreneur creates more than ten new job opportunities, then the amount of subsidy is increased by the financial amount equal to two average monthly wages. The choice to participate in the programme depends on the character, skills and mainly on the motivation of unemployed individual. In principle, unemployed applicants need to create a business plan, cost structure, consult and defend their own idea in front of the labour office committee. Approved amount of the subsidy finally depends on the cost structure, business idea and it is allocated to the newly self-employed after signing the contract (after the new business is officially registered). Newly created enterprise needs to sustain at least for 365 days. Labour office prefers applicants, who formerly accomplished retraining course "foundations of entrepreneurship." The advantage is that the retraining course often includes orientation part which may discourage some unemployed from a "bad" decision to start self-employment (based on unrealistic expectations), to make debts by entrepreneurship and as a consequence to further worsen their situation instead of expected improvement. Applicants who successfully accomplished the course are hence more likely to form clear expectations about their future business activity. Approval of the subsidy is

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[2] In Czech "Příspěvek na zřízení společensky účelného pracovního místa (SÚPM) zřízeného uchazečem o zaměstnání za účelem výkonu samostatně výdělečné činnosti" (Czech Employment Law, 435/2004).

made by the regional labour office, since this subsidy is allocated regionally. One also needs to point out, that sometimes the regional labour offices attach for applicants additional specific requirements. Once the deal is signed and the enterprise is established, newly self-employed starts paying social insurance and health insurance and quits the unemployment (Ministry of Labour and Social Affairs, 2016; Czech Employment Law, 435/2004).

From the regional perspective, subsidies were more distributed in the regions suffering from the higher unemployment rates. It looks that the start-up subsidy is not often used as a tool of active labour market policy in the Czech Republic. To illustrate that, in 2015 there were 478.9 thousands of unemployed, but out of them only 3 212 (0.7%) were supported to become self-employed (Ministry of Labour and Social Affairs, 2015). The newly created jobs may then result even in lower unemployment rate in the region, therefore it is surprising, that the programme is not used more often. This positive spillover is called in labour economics "a double dividend" (e. g. Caliendo and Künn, 2014 or Dvouletý and Lukeš, 2016). Caliendo et al. (2016) in their recent review of empirical literature also report the positive outcomes of self-employment policy for unemployed. To evaluate the programme, I conduct regression analysis from the regional/aggregated perspective. I empirically test, whether the amount of supported individuals was associated with the lower rates of unemployment. I also further test, whether the programme influenced the regional rates of employment as additional spillover of the programme. Empirical analysis is based on the panel of fourteen NUTS 3 regions for the period of years 2012-2015. Variables were obtained from the Yearbooks of the Ministry of Labour and Social Affairs, Eurostat and the Czech Statistical Office.

Regression models estimated with the fixed effects supported the negative impact of the supported self-employed on the unemployment rates in the Czech regions as described by the theory of necessity entrepreneurship. The second set of econometric models was used to test the potential spillovers of the programme on the regional employment rate. Unfortunately, no conclusive results were found and this question needs to be investigated again in the future. The presented analysis has been however conducted from the aggregated

perspective, and therefore the presented results need to be interpreted with particular caution. Analysis of the direct costs of the programme revealed that the costs of the self-employment programme are not that high, if one takes into account alternative costs of the unemployment benefits paid to unemployed and social insurance paid back to the state by the newly established self-employed. According to Global Entrepreneurship Monitor (2013) in the Czech Republic 22% of those who were engaged in entrepreneurial activity started their enterprise out of necessity because they had no other option to work. However only 0.7% of unemployed got during the years 2013-2014 a chance to be supported by the self-employment programme to establish their own enterprise. The neighbouring countries use this form of support as a tool of active labour market policy more frequently. During the same period was the same ratio 1% in Slovakia, 1.4% in Germany, 2.9% in Poland and the highest engagement reports Austria, where 8.8% of unemployed were supported to start their own business (Eurostat, 2016b; 2016c)[3]. Based on these figures I humbly suggest to apply self-employment programme in the Czech Republic more frequently, I can imagine that the ratio of supported unemployed could be in the Czech Republic increased up to 1.5%, since there is a significant ratio of people starting business out of necessity. My claims are supported also by the more frequent usage of the programme in neighbouring countries of the Czech Republic. However the exact number should be discussed by the policy makers, labour office representatives and it could be further modified. Based on the previous research, the most important task for the labour office workers is to persuade unemployed to establish a business, to encourage them and to remove their fear of failure (e. g. Žambochová,

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[3] Statistics reported by Eurostat (2016b; 2016c) slightly differed to those reported by the national ministries of the labour and social affairs of the above mentioned countries, however author used these number to achieve comparability across the countries, taking into account this limitation. The ratio was calculated as the number of unemployed entrants into self-employment programme and annual average of unemployed for years 2013-2014 (Eurostat categories: *Participants by LMP intervention* and *Unemployment by sex and age - annual average).*

2013; Lukeš and Zouhar, 2013 or Lukeš et al., 2013). Unemployed individuals are also afraid of administrative barriers and bureaucracy. Continuous reduction of administrative barriers in the future is therefore needed (Dvoulety and Mareš, 2016a). Unemployed are also afraid to pay for their first costs, including the social and health insurance which needs to be paid from the first month after they officially register their new business activity. One way to encourage the rates of newly established self-employed out of unemployment could be to postpone payments for social and health insurance during the first months and to give to formerly unemployed time to earn their first revenues (Krajčová et al., 2013).

Future research should challenge the effectiveness of the start-up subsidy programmes in the Czech Republic on the individual level. Such an empirical analysis could provide information about the survival rates of subsidized businesses, but also about the incomes of their formerly unemployed owners. Establishment of the strong cooperation between the research community and public authorities is therefore required. Such a cooperation could lead to a construction of the follow-up survey for formerly unemployed individuals, which could deliver requested data about the income, job satisfaction and their employment status. Collected data would allow implementation of the counterfactual analysis, which could answer the questions related to the impact of the self-employment programme on the different social groups and that could help to address the most benefiting groups participating in the programme. For more details (e. g. limitations, discussion, policy recommendations and suggestions for future research), see the whole article entitled "Does the Self-employment Policy Reduce Unemployment and Increase Employment? Empirical Evidence from the Czech Regions" in chapter 6. Annex 2 is furthermore dedicated to the review of empirical studies assessing impacts of self-employment programmes for unemployed on an individual level.

2.5. Public Support through Financial Instruments

Recently published reviews of empirical literature by Grimm and Paffhausen (2015) and by Cho and Honorati (2014) show that it is important to establish access to capital for new entrepreneurs. One way to allocate the financial capital towards new entrepreneurs and to help them with the establishment of their own business, is through the system of soft loans and credit guarantees provided by the public sector. The reasoning behind this form of public support, which has become an interest in this study, is to facilitate an access to the financial capital and to remove the financial barriers of high interest rates, collateral requests and other disadvantageous conditions offered by the regular market based financial institutions. Compared to the capital grants and to other non-repayable forms of support, in the case of soft loans and credit guarantees, all resources allocated by the state do not have to necessarily imply a negative cash flow for the state, because not all supported individuals result in bankruptcy. For the supported SMEs is gained capital a chance to growth, to offer new jobs and to expand their business activities. Accordingly, their support may lead to an increased economic growth and reduction of unemployment (e. g. Gaia et al., 2016; Perglova and Angulo-Ruiz, 2014; Bondonio and Greenbaum, 2014; Biagi et al., 2015 or Arping et al., 2010).

Most of the recent studies in the Central and Eastern European region have been focused on the evaluation of cohesion R&D policies and those aimed at the elimination of the regional disparities (e. g. Mateut, 2017, Čadil et al., 2017, Stonkute and Vveinhardt, 2017, Blažková, 2016; Mirošník et al., 2016, Srholec and Žížalová, 2014, Potluka et al., 2013 or Hartsenko and Sauga, 2013), policies facilitating trainings and education (Potluka et al., 2016 or Kopečná, 2016) and effectivity of the self-employment programmes for the unemployed (Dvouletý, 2017c or Hora and Suchanec, 2014). However, based on a search in the databases of previously published academic articles and research reports, no study has been focused on the evaluation of entrepreneurship support through the financial instruments yet.

2.5.1. Czech Public Program START – Chapter 6

The programme START took place in the Czech Republic in the two subsequent calls, during the period of years 2007-2011. As requested for the EU public support, the programme was following the principle *de minimis*. The programme was a part of the Operational Programme Enterprises and Innovation (OPEI) funded from the European Regional and Development Fund (ERDF) during the EU programming period of years 2007-2013 (European Commission, 2016a; 2016b). The main organizing institutions, which were responsible for the programme, were the Czech-Moravian Guarantee and Development Bank (2016) and the Ministry of Industry and Trade (2016a). The programme START intended to support completely new entrepreneurs, or those who were starting a business activity seven years after they ended their previous one. The programme´s objective was to increase competitiveness of the Czech Republic. The idea behind the programme was to facilitate access to financial capital for new business ideas through the system of zero interest soft loans and credit guarantees.

Applicants had to meet several criteria to obtain public support. Applicants could choose between the two forms of support from the programme START. The first one offered them a zero interest soft loan covering up to 90% of the project costs, up to 0.75 mil. CZK in the case of solo entrepreneur, or up to 1.5 mil. CZK in the case of entrepreneurial team. The maximum possible maturity was set up to be seven years. The second scheme offered applicants a credit guarantee covering up to 80% of the loan. The maximum amount of the loan was 1.5 mil. CZK and the maturity had to be longer than three years. Recipient of the guarantee had to pay 0.1% p. a. of the guarantee for the service, however at the same time he/she received a public support worth 3% of the guarantee. If the guarantee was not applied, the project was implemented successfully within two years, and the supported entrepreneur(s) was/were repaying the loan, then the recipient received an extra bonus making 15% of the loan (Ministry of Industry and Trade, 2016a; 2016b).

The total amount of funds allocated to the projects from public resources was 79.7 mil. CZK; however, the projects got financial capital worth 170.3 mil. CZK in total, since

the loans and guarantees were organized within the partnerships with other market based financial institutions. 88 projects were supported by the credit guarantees and 100 projects got zero interest soft loans. The highest share of the projects was supported in 2008 and the last projects were supported in 2010. The majority of the supported were self-employed/freelances (107) and the rest of them represented a business company. From the projects supported by the credit guarantees, the most frequent project was the construction of the photovoltaic power plants and out of the projects supported by the zero interest soft loans, it was the foundation of a store. When it comes to the number of employees, the majority of the supported businessmen (112) reported that they have fewer than five employees.

To see whether this remarkable allocation of financial capital had any impact on the financial performance of the supported enterprises, I run the following counterfactual analysis, applying the methodology of previous scholars (e. g. Biagi et al., 2015; Kim et al., 2015; Bondonio and Greenbaum, 2014 or Kösters, 2010) assuming a quasi experimental research framework. Tested hypothesis assumes a better financial performance of the supported (Treated) firms, in comparison with the control group, in terms of higher profits, higher return on assets (ROA), higher return on equity (ROE), higher sales, higher assets turnover and lower debt ratio four years after the end of programme.

Empirical analysis is based on the firm level data, covering the period of years 2006-2014. Based on the list of supported projects (Ministry of Industry and Trade, 2016b), 188 supported companies were identified. As a second step, the database Albertina (Bisnode, 2016) was used to collect the data. To ensure that the selection of companies in the control group would not affect the results, a control group of 18,499 firms was selected randomly from the population of active enterprises and their data were collected from the database. Unfortunately, the dataset suffers from an extreme amount of missing values. No data could be obtained for the self-employed/freelancers (107) participating in the programme, which do not have any obligation to report their financial records. Out of the 81 remaining business companies, I was able to collect data for 57 firms, having in total data for 30% of all

supported enterprises and for 70% of the supported business companies. Therefore I am able to evaluate the programme only with respect to the supported business companies. Control sample finally consisted out of 10,681 firms, having complete data.

The main advantage of counterfactual analysis is that the estimated effect of the participation in the programme START (Average Treatment Effect on the Treated – ATET) is quantified after the application of the matching procedures (kernel matching, propensity score matching and nearest neighbour matching). Matching procedures are implemented to connect with each of the supported firm (Treated) a partner non-supported firm (Control) with the most possible similar characteristics based on the estimated propensity score. The outcomes are analysed as four year averages after the intervention was over (averages for years 2011-2014), allowing me to discuss particular effects of the programme.

Out of the six indicators, the variable representing sales, was found to be the most statistically significant, proving that compared to the control group, firms which participated in the programme START (Treated) reported on average lower sales during the period of four years after the participation in the programme (2011-2014). The second statistically significant outcome variable, representing assets turnover, confirmed that firms which participated in the programme START (Treated) reported on average lower assets turnover during the period of four years after the participation in the programme (2011-2014). The remaining indicators could not prove any statistically significant impact of the programme. Noteworthy is that all three variables measuring a firm´s profitability (net profit, return on assets and return on equity) suggested a negative influence of the programme, regardless of the applied matching technique. The variable representing debt ratio further suggested that firms supported by the programme reported on average higher debt ratio in comparison with the control group. Stated hypothesis assuming a better financial performance of the supported (Treated) firms, in comparison with the control group, in terms of higher net profits, higher return on assets (ROA), higher return on equity (ROE), higher sales, higher assets turnover and lower debt ratio, based on the obtained results cannot be supported.

Based on this empirical experience, there are many implications that need to be transferred to policy makers. It looks like public authorities and external evaluators of the programme START failed to support projects with a growth potential. Therefore the public authorities should more carefully inspect the cost structures of the projects and judge whether the amounts of requested funds are adequate for the business intentions and to filter out requests which only aim to collect as much funding as possible for the given favourable conditions. In order to increase the quality of the evaluation process and due diligence of the project proposals, additional training of the evaluation team might be useful. Nevertheless, there are researchers (e. g. Parker and van Praag, 2006) who doubt that public sector employees could better or equally correctly screen the project proposals and to minimize information asymmetries, compared to the banks and regular market based financial institutions.

For future evaluations of the public programmes in Central and Eastern Europe, researchers need to have reliable data, which may result from the narrow cooperation between the research community and public authorities (e. g. Dvouletý and Lukeš, 2016). Such cooperation would help policy makers to establish a set of outcome indicators and pathways to their evaluation. Presented experience revealed that it is very difficult to assess the data, which are not available. It is therefore impossible to assess employment outcomes of the programme. Thus it is necessary for policy makers, setting up the rules of the programme, to include a reporting duty on the supported companies on the amount of employees, or to extract the data from the social security system. Reporting duty also needs to be imposed on financial variables and on all forms of entrepreneurship (e. g. self-employed/freelances), otherwise their data cannot be included in the evaluation. Additionally, the list of rejected participants should be available for research purposes as well. It would be excellent if the public authorities (in the case of this particular study the Czech Ministry of Industry and Trade), would collect the key financial indicators (from the balance sheets, profit and loss statements, cash flow and employees reports) by themselves and based on a mutual confidential agreement would facilitate the data to the particular research teams.

Follow-up research could investigate the potential effects of the programme on other outcome variables. An interesting variables might be growth in employment, productivity, investment intensity and assets. Another suggestion might be to investigate outcomes of the programme with respect to sectors to see, which sectors mostly benefit from public interventions. For more details (e. g. limitations, discussion, policy recommendations and suggestions for future research), see the whole article entitled "Effects of Soft Loans and Credit Guarantees on the Performance of the Supported Companies: Evidence from the Czech Public Programme START" in chapter 7.

2.6. Concluding Remarks and Future Research

The main objective of the doctoral dissertation thesis was to enrich academia and policy makers by an empirical evidence on the influence of entrepreneurship on economic growth, determinants of entrepreneurial activity and effects of public entrepreneurship and self-employment policies. The motivation originated in the need to seek empirical answers to the current research challenges in the field of entrepreneurship. Series of quantitative research articles were written in order to mitigate this research gap and to respond to the five stated research sub-goals. Different levels of analysis were researched, starting from the most aggregated macro level (a group of countries), continuing through meso level (industries or regions) and ending up on the micro level (firms).

The first study responded to the issue of measuring entrepreneurial activity in a cross-country settings on the example of Nordic countries (sub-goal 1). Empirical findings presented in chapter 3 showed no difference in obtained results, when using two ways of measuring entrepreneurial activity, i. e. rate of registered business activity and established business ownership rate obtained from the Global Entrepreneurship Monitor. The article offered also an overview on the role of traditional cross-country determinants of

entrepreneurship and it empirically proved the negative influence of administrative barriers on the level of entrepreneurial activity. The obtained results from the regression models suggest to the Nordic entrepreneurship policy makers to put more effort into the reduction of administrative barriers towards founding enterprises in the Nordic countries. The entrepreneurial ecosystem in the Nordic region needs to be built on an effective and business-friendly legislation framework with effective regulatory authorities.

The second study was conducted based on the identified lack of studies investigating the influence of entrepreneurship on regional economic development (sub-goal 2). Empirical study of the Czech regions utilized two ways how to operationalize new entrepreneurial activity on the regional level, i. e. rate of newly established business companies and partnerships and rate of newly established self-employed. Econometric results that are shown in chapter 4, revealed that both forms of newly established entrepreneurial activity were associated with lower unemployment rates, however, only the higher rates of newly established business companies and partnerships were positively associated with the current levels of GDP per capita. It is therefore important to distinguish between different forms of entrepreneurship and their influence on regional economic development. The Czech entrepreneurship policies focused on the growth of GDP and economic boom should hence be oriented more on the support of business companies delivering new job opportunities.

The third article contributed to the discussion on the dynamics of the relationship between entrepreneurship and unemployment rate in the Czech regions which is theoretically justified by the theory of necessity entrepreneurship (sub-goal 3). Results presented in chapter 5 showed that it takes about two years for entrepreneurial activity to grow above its initial level after the increase in unemployment rate. Entrepreneurship policy makers should find the ways to support individuals struggling with an engagement into entrepreneurship, particularly by preparing a set of actions, guiding potential entrepreneurs through the process of business start-up and therefore speed up the process of founding enterprises which could lead to acceleration of the total increase in entrepreneurial activity with all its positive externalities.

The fourth study was focused on the evaluation of the Czech self-employment programme for unemployed individuals on the regional level (sub-goal 4). Analysis of effects, cost structure and comparison with neighbouring countries presented in chapter 6 have revealed a potential of more frequent usage of the self-employment programme for unemployed in the Czech Republic. Based on the previous research (e. g. Žambochová, 2013), the most important task for the labour office workers is to persuade unemployed to establish a business, to encourage them and to remove their fear of failure. Unemployed are also afraid to pay for their first costs, including the social and health insurance which needs to be paid from the first month after they officially register their new business activity. One way to encourage the rates of newly established self-employed out of unemployment could be to postpone payments for social and health insurance during the first months and to give to formerly unemployed time to earn their first revenues.

The fifth article was also focused on the policy analysis for the new entrepreneurs, and it investigated the impact of soft loans and credit guarantees on the performance of newly established enterprises (sub-goal 5). Implemented counterfactual analysis on the firm level presented in chapter 7 failed to report a positive impact of the programme on the performance of the supported enterprises. It looks like public authorities and external evaluators of the programme failed to support projects with a growth potential. Therefore the public authorities should more carefully inspect the cost structures of the projects and judge whether the amount of requested funds are adequate for the business intentions and to filter out requests which only aim to collect as much funding as possible for the given favourable conditions. In order to increase the quality of the evaluation process and due diligence of the project proposals, additional training of the evaluation team might be useful.

The contribution of all above-mentioned studies lies in the effort to collect empirical data and to create knowledge to help stakeholders and policy makers to form evidence driven policies promoting entrepreneurship and self-employment. Empirical analysis on macro and meso level might be a good guide when forming an entrepreneurial ecosystem. However, if we would like to know the impact of particular programme or policy, then we must evaluate

the specific intervention with respect to the supported and non-supported business entities. Lack of empirical data is a strong barrier which limits the presented findings. Each of the studies has tried to demonstrate that there are ways how to enrich empirical knowledge, however, at the same time, the presented findings are limited to the amount of analysed years, variables or supported firms. A good policy-related research must be based on a strong collaboration with the public institutions. Public authorities often lack knowledge about the appropriate research methods, on the other hand, researchers often miss details about the interventions and they cannot impose any reporting duties and follow-up surveys on the participants of the public programmes. Therefore one particular outcome of my research is the need for the establishment of a partnership between the research community and public sector, which according to my best knowledge and experience, does not work well in the Czech Republic.

Presented studies also offer several directions for future research. The first challenge calls for a verification of the determinants of various measures of entrepreneurial activity in the cross-country studies and to observe, whether the results are same, as it was showed in the case of Nordic countries. The second challenge suggests investigating impact of various forms of entrepreneurship, e. g. high-growth entrepreneurship/business companies vs. solo-entrepreneurs/freelancers, on regional economic development, based on the empirical results for the Czech regions. Third suggestion calls for an individual-level empirical analysis of the outcomes of the self-employment programme for unemployed in the Czech Republic since the presented study evaluated programme only on the regional level. Finally, fourth research recommendation highlights the need to investigate long-term firm-level outcomes of the Czech entrepreneurship policies, such as programme START, which were implemented during the EU programming period of years 2007-2013.

2.7. References

Acs, Z., Åstebro, T., Audretsch, D., & Robinson, D. T. (2016). Public policy to promote entrepreneurship: a call to arms. *Small Business Economics*, *47*(1), 35-51.

Acs, Z.J., Szerb, L. & Autio, E. (2016). The global entrepreneurship and development index", *Global Entrepreneurship and Development Index 2015*, Springer International Publishing AG, Cham, 11-31.

Ahl, H., Berglund, K., Pettersson, K. & Tillmar, M. (2016). From feminism to FemInc.ism: on the uneasy relationship between feminism, entrepreneurship and the Nordic welfare state. *International Entrepreneurship and Management Journal*, *12*(2), 369-392.

Aidis, R., Estrin, S., & Mickiewicz, T. (2008). Institutions and entrepreneurship development in Russia: A comparative perspective. *Journal of Business Venturing*, *23*(6), 656-672.

Albulescu, C. T., & Tămăşilă, M. (2016). Exploring the role of FDI in enhancing the entrepreneurial activity in Europe: a panel data analysis. *International Entrepreneurship and Management Journal*, *12*(3), 629-657.

Aparicio, S., Urbano, D., & Audretsch, D. (2016). Institutional factors, opportunity entrepreneurship and economic growth: Panel data evidence. *Technological Forecasting and Social Change*, *102*, 45-61.

Arping, S., Lóránth, G., & Morrison, A. D. (2010). Public initiatives to support entrepreneurs: Credit guarantees versus co-funding. *Journal of Financial Stability*, *6*(1), 26-35.

Audretsch, D. B., Belitski, M., & Desai, S. (2015). Entrepreneurship and economic development in cities. *The Annals of Regional Science*, *55*(1), 33-60.

Baum, J. R., Frese, M., & Baron, R. A. (2014). *The psychology of entrepreneurship*. Psychology Press.

Baumol, W. J. (1996). Entrepreneurship: Productive, unproductive, and destructive. *Journal of Business Venturing*, *11*(1), 3-22.

Baptista, R., & Thurik, A. R. (2007). The relationship between entrepreneurship and unemployment: Is Portugal an outlier?. *Technological Forecasting and Social Change*, *74*(1), 75-89.

Baštová, M., Hubáčková, V., & Frantál, B. (2011). Interregional differences in the Czech Republic, 2000-2008. *Moravian Geographical Reports*, 19(1), 2-16.

Belás, J., Demjan, V., Habánik, J., Hudáková, M., & Sipko, J. (2015). The business environment of small and medium-sized enterprises in selected regions of the Czech Republic and Slovakia. *E+M Ekonomie a Management*, (1): 95-111.

Berkowitz, D. & DeJong, D. N. (2005). Entrepreneurship and Post-socialist Growth. *Oxford Bulletin of Economics and Statistics*, 67(1), 25–46.

Bia, M., & Mattei, A. (2012). Assessing the effect of the amount of financial aids to Piedmont firms using the generalized propensity score. *Statistical Methods & Applications*, *21*(4), 485-516.

Biagi, F., Bondonio, D., & Martini, A. (2015). *Counterfactual Impact Evaluation of Enterprise Support Programmes. Evidence from a Decade of Subsidies to Italian Firm*. European Regional Science Association.

Bisnode (2016). Database Albertina - Gold Edition. Available from www: < http://www.albertina.cz/ >. Accessed on 5 August 2016.

Bjørnskov, C., & Foss, N. (2013). How strategic entrepreneurship and the institutional context drive economic growth. *Strategic Entrepreneurship Journal*, *7*(1), 50-69.

Bjørnskov, C., & Foss, N. J. (2016). Institutions, Entrepreneurship, and Economic Growth: What Do We Know and What Do We Still Need to Know?. *The Academy of Management Perspectives*, *30*(3), 292-315.

Blanchflower, D. G. (2000). Self-employment in OECD countries. *Labour economics*, *7*(5), 471-505.

Blanchflower, D. G., & Meyer, B. D. (1994). A longitudinal analysis of the young self-employed in Australia and the United States. *Small Business Economics*, 6(1), 1-19.

Blažková, I. (2016). The Impact of the Public Support for R & D on the Economic Performance of SMEs. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *64*(1), 213-222.

Block, J., & Koellinger, P. (2009). I can't get no satisfaction—Necessity entrepreneurship and procedural utility. *Kyklos*, *62*(2), 191-209.

Block, J., & Sandner, P. (2009). Necessity and opportunity entrepreneurs and their duration in self-employment: evidence from German micro data. *Journal of Industry, Competition and Trade*, *9*(2), 117-137.

Bondonio, D., & Greenbaum, R. T. (2014). Revitalizing regional economies through enterprise support policies: an impact evaluation of multiple instruments. *European Urban and Regional Studies*, 29(1), 79-103.

Bosma, N., & Harding, R. (2006). *Global Entrepreneurship Monitor: GEM 2006 summary results*. Babson Park/London: Babson College/London Business School.

Bosma, N., Hessels, J., Schutjens, V., Van Praag, M., & Verheul, I. (2012). Entrepreneurship and role models. *Journal of Economic Psychology*, *33*(2), 410-424.

Bosma, N. S., Stam, F. C., & Terjesen, S. A. (2016). Advancing Public Policy for High-Growth, Female, and Social Entrepreneurs. *Public Administration*, *76*(2), 230-239.

Brandstätter, H. (2011). Personality aspects of entrepreneurship: A look at five meta-analyses. *Personality and individual differences*, *51*(3), 222-230.

Brekke, T. (2015). Entrepreneurship and path dependency in regional development. *Entrepreneurship & Regional Development*, *27*(3-4), 202-218.

Brockhaus, R. H. (1980). Risk taking propensity of entrepreneurs. *Academy of management Journal*, *23*(3), 509-520.

Bruton, G. D., Ahlstrom, D., & Li, H. L. (2010). Institutional theory and entrepreneurship: where are we now and where do we need to move in the future?. *Entrepreneurship theory and practice*, *34*(3), 421-440.

Bulanova, O., Isaksen, E. J., & Kolvereid, L. (2016). Growth aspirations among women entrepreneurs in high growth firms. *Baltic Journal of Management*, *11*(2), 187-206.

Burns, P. (2010). *Entrepreneurship and Small Business: Start-up. Growth and Maturity*. Palgrave Macmillan.

Caliendo, M., & Kritikos, A. S. (2010). Start-ups by the unemployed: Characteristics, survival and direct employment effects, *Small Business Economics*, *35*(1), 71–92.

Caliendo, M., & Künn, S. (2014). Regional effect heterogeneity of start-up subsidies for the unemployed. *Regional Studies*, *48*(6), 1108-1134.

Caliendo, M. (2016). Start-up subsidies for the unemployed: Opportunities and limitations. *IZA World of Labor*, *2016*, 1-11.

Calmfors, L. (1994). *Active labour market policy and unemployment: A framework for the analysis of crucial design features*. Organisation for Economic Co-operation and Development (OECD).

Carree, M., Congregado, E., Golpe, A., & van Stel, A. (2015). Self-employment and job generation in metropolitan areas, 1969–2009. *Entrepreneurship & Regional Development*, *27*(3-4), 181-201.

Carree, M. A., & Thurik, A. R. (2008). The lag structure of the impact of business ownership on economic performance in OECD countries. *Small Business Economics*, *30*(1), 101-110.

Carree, M.A. & Thurik, A.R. (2010). The impact of entrepreneurship on economic growth, in Acs, Z.J. and Audretsch, D.B. *Handbook of Entrepreneurship Research*, Springer, New York, NY, 557-594.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American journal of sociology*, *94*, S95-S120.

Congregado, E. (2007). *Measuring Entrepreneurship: Building a Statistical System*. Springer Science & Business Media.

Congregado, E., Golpe, A. A., & Parker, S. C. (2012). The dynamics of entrepreneurship: hysteresis, business cycles and government policy. *Empirical Economics*, *43*(3), 1239-1261.

Craig, B. R., Jackson, W. E., & Thomson, J. B. (2007). Small Firm Finance, Credit Rationing, and the Impact of SBA-Guaranteed Lending on Local Economic Growth. *Journal of small business management*, *45*(1), 116-132.

Cueto, B., Mayor, M., & Suárez, P. (2015). Entrepreneurship and unemployment in Spain: a regional analysis. *Applied Economics Letters*, 22(15), 1230-1235.

Czech Employment Law/Zákon o Zaměstnanosti, 435/2004 Sb. (2004). *Společensky účelná pracovní místa § 113*, Accessed on 17th October 2016. www: < https://portal.mpsv.cz/sz/obecne/prav_predpisy/akt_zneni/ZOZ_PLATNE_ZNENI_OD_1. 9.2016.PDF. >.

Čadil, J., Mirošník, K., & Rehák, J. (2017). The lack of short-term impact of cohesion policy on the competitiveness of SMEs. *International Small Business Journal*. (in print)

Damborský, M., & Wokoun, R. (2010). Location Factors of Small and Medium Entrepreneurship under the economic conditions of the Czech Republic. *E +M Ekonomie a Management*, *13*(2), 32-43.

Davidsson, P., & Wiklund, J. (2007). Levels of Analysis in Entrepreneurship Research: Current Research Practice and Suggestions for the Future. *Entrepreneurship*, 245-265. Springer Berlin Heidelberg.

Dunn, T., & Holtz-Eakin, D. (2000). Financial capital, human capital, and the transition to self-employment: Evidence from intergenerational links. *Journal of labor economics*, *18*(2), 282-305.

Dvouletý, O. (2017a). Determinants of Nordic Entrepreneurship. *Journal of Small Business and Enterprise Development*, 24(1), 12-33.

Dvouletý, O. (2017b). Can Policy Makers Count with Positive Impact of Entrepreneurship on Economic Development of the Czech Regions?. *Journal of Entrepreneurship in Emerging Economies*, 9(3). (in print)

Dvouletý, O. (2017c). Relationship between Unemployment and Entrepreneurship Dynamics in the Czech Regions: A Panel VAR Approach. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 65(3), 987-995.

Dvouletý, O. (2017). Does the Self-employment Policy Reduce Unemployment and Increase Employment? Empirical Evidence from the Czech Regions. *Central European Journal of Public Policy*, 2(11). (in print)

Dvouletý, O., & Lukeš, M. (2016). Review of Empirical Studies on Self-Employment out of Unemployment: Do Self-Employment Policies Make a Positive Impact? *International Review of Entrepreneurship*, 14(3), 361-376.

43

Dvouletý, O., & Mareš, J. (2016a). Determinants of regional entrepreneurial activity in the Czech Republic. *Economic Studies & Analyses/Acta VSFS*, 10(1), 31-46.

Dvouletý, O., & Mareš, J. (2016b). Relationship between unemployment and entrepreneurial activity: Evidence found among Visegrad countries. *Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS 2016),* 146-156.

Dvouletý, O., & Mareš, J. (2016c). Entrepreneurial activity in the Czech regions: Are business companies and self-employed individuals affected by the same factors? *10th International Days of Statistics and Economics,* 418-428.

Edoho, F. M. (2016). Entrepreneurship paradigm in the new millennium: A critique of public policy on entrepreneurship. *Journal of Entrepreneurship in Emerging Economies*, *8*(2), 279-294.

Eurostat (2016b). Participants by LMP intervention. Available from www: < http://ec.europa.eu/eurostat/data/database >. Accessed on 5 August 2016.

Eurostat (2016c). Unemployment by sex and age - annual average. Available from www: < http://ec.europa.eu/eurostat/data/database >. Accessed on 5 August 2016.

Fagerberg, J. and Fosaas, M. (2014). Innovation and innovation policy in the Nordic region, available at: www.feps-europe.eu/assets/a8bc47f5-7441-4f4a-ac8a-3b1d4a9f89fc/innovation.pdf (accessed 22 April 2016).

Floyd, D. (2014). *Handbook of Emerging Economies*, *Journal of Entrepreneurship* in *Emerging Economies*, 6(3), 312-313.

Fotopoulos, G. (2014). On the spatial stickiness of UK new firm formation rates. *Journal of Economic Geography*, *14*(3), 651-679.

Fritsch, M. (2008). How does new business formation affect regional development? Introduction to the special issue. *Small Business Economics*, 30(1), 1-14.

Fritsch, M., Kritikos, A., & Pijnenburg, K. (2015). Business cycles, unemployment and entrepreneurial entry - evidence from Germany. *International Entrepreneurship and Management Journal*, 11(2), 267-286.

Fritsch M. & Mueller P. (2004) Effects of new business formation on regional development over time, *Regional Studies* 38, 961-975.

Fritsch, M., & Mueller, P. (2008). The effect of new business formation on regional development over time: The case of Germany. *Small Business Economics*, 30(1), 15-29.

Freytag, A., & Thurik, R. (2007). Entrepreneurship and its determinants in a cross-country setting. *Journal of evolutionary Economics*, *17*(2), 117-131.

Gai, L., Ielasi, F., & Rossolini, M. (2016). SMEs, public credit guarantees and mutual guarantee institutions. *Journal of Small Business and Enterprise Development*, *23*(4), 1208-1228.

Gartner, W. (1985), *Handbook of Entrepreneurial Dynamics: The Process of Business Creation*, Sage, Thousand Oaks, CA, p. xxvii.

Gatewood, E.J., Greene, P.G. & Thulin, P. (2014). Sweden and the United States: differing entrepreneurial conditions require different policies. *20 years of Entrepreneurship Research, Swedish Entrepreneurship Forum*, 95-108.

Global Entrepreneurship Monitor (2013). Necessity-Driven Entrepreneurial Activity: Relative Prevalance, the Czech Republic. Available from www: < http://www.gemconsortium.org/data/key-indicators >. Accessed on 5 August 2016.

Global Entrepreneurship Monitor (2016). Global entrepreneurship monitor (GEM). Available from www: < www.gemconsortium.org/data >. Accessed on 22 April 2016.

Grilo, I. and Thurik, R. (2004). Determinants of entrepreneurship in Europe, Working Paper No. ERS-2004-106-ORG, *ERIM Report Series*, Erasmus Research Institute of Management, Rotterdam.

Grimm, M., & Paffhausen, A. L. (2015). Do interventions targeted at micro-entrepreneurs and small and medium-sized firms create jobs? A systematic review of the evidence for low and middle income countries. *Labour Economics*, *32*, 67-85.

Hájek, O., Nekolová, J., & Novosák, J. (2015). Determinants of New Business Formation-Some Lessons from the Czech Republic. *Economics & Sociology*, *8*(1), 147-156.

Hartsenko, J., & Sauga, A. (2013). The role of financial support in SME and economic development in Estonia. *Business and Economic Horizons*, 9(2), 10-22.

Hjorth, D. (2008). Nordic entrepreneurship research. *Entrepreneurship Theory and Practice*, *32*(2), 313-338.

Hjorth, D. & Steyaert, C. (2008). *The Politics and Aesthetics of Entrepreneurship*, Edward Elgar, Cheltenham.

Holienka, M., Pilková, A., & Jancovicová, Z. (2016). Youth Entrepreneurship in Visegrad Countries. *Entrepreneurial Business and Economics Review*, *4*(4), 105-121.

Hora, O., & Suchanec, M. (2014). Zhodnocení programů aktivní politiky zaměstnanosti realizovaných v České republice v období krize. *Česká politika zaměstnanosti v době krize a po krizi. Brno/Boskovice: MUNIpress/Albert*, 143-182.

Chalk, A. F. (1967). Relativist and absolutist approaches to the history of economic theory. *The Southwestern Social Science Quarterly*, 5-12.

Cho, Y. & Honorati, M., (2014). Entrepreneurship programs around the developing world: a meta analysis. *Labour Economics*, 28, 110–130.

Karlsson, Ch., Johannisson, B. & Storey, D. (1993), *Small Business Dynamics: International, National, and Regional Perspectives, Routledge*, New York, NY, p. xiv.

Kim, Y., Oh, I., & Lee, J. D. (2015). Economic Impact Assessment of Public–Private Matching Fund Programs Using Firm-Level Data. *The Singapore Economic Review*, *60*(4), 1550060.

Klapper, L., Love, I., & Randall, D. (2015). New firm registration and the business cycle. *International Entrepreneurship and Management Journal*, *11*(2), 287-306.

Koellinger, P. D., & Roy Thurik, A. (2012). Entrepreneurship and the business cycle. *Review of Economics and Statistics*, *94*(4), 1143-1156.

Kolařík, P., Šumpela, V., & Tomešová, J. (2014). European Union's Cohesion Policy-Diversity of the Multi-Level Governance Concept, the Case Study of Three European States. *European Spatial Research and Policy*, *21*(2), 193-211.

Kösters, S. (2010). Subsidizing start-ups: policy targeting and policy effectiveness. *Journal of Industry, Competition and Trade*, *10*(3-4), 199-225.

Krajčová, J., Šebestíková, V., Křelinová, V., Vanduchová, P. & Beran, P. (2013). Možnosti Vlivu Daňové a Dotační Politiky Státu na Snížení Nezaměstnanosti v České republice. *Acta Academica Karviniensia*, 2013(1), 83-100.

Krelová, K. K., & Krpálek, P. (2014). Possibilities to Support Entrepreneurship in the Czech Republic and Slovakia. *Universal Journal of Industrial and Business Management*, *2*(8), 210-218.

Kuckertz, A., Berger, E.S. and Allmendinger, M.P. (2015), "What drives entrepreneurship?", *Die Betriebswirtschaft – Business Administration Review*, Vol. 75 No. 4, pp. 273-288.

Kutscherauer, A., Fachinelli, H., Hučka, M., Skokan, K., Sucháček, J., Tománek, P., & Tuleja, P. (2010). *Regional disparities in regional development of the Czech Republic–their occurrence, identification and elimination*. Ostrava: VŠB-Technical University of Ostrava.

Llopis, J. A. S., Millán, J. M., Baptista, R., Burke, A., Parker, S. C., & Thurik, R. (2015). Good times, bad times: entrepreneurship and the business cycle. *International Entrepreneurship and Management Journal*, *11*(2), 243-251.

Loužek, M. (2009). *Metodologie ekonomie*. Karolinum.

Lukeš, M. (2013). Entrepreneurs as Innovators: A Multi-Country Study on Entrepreneurs' Innovative Behaviour. *Prague Economic Papers*, *22*(1), 72-84.

Lukeš, M., Jakl, M., & Zouhar, J. (2014). *Global Entrepreneurship Monitor 2013 for the Czech Republic. Podnikatelská aktivita v České republice.* Retrieved September 20, 2016, from http://www.mpo.cz/dokument149362.html.

Lukeš, M., Zouhar, J., Jakl, M., & Očko, P. (2013). Faktory ovlivňující vstup do podnikání: začínající podnikatelé v České republice. *Politická ekonomie*, *61*(2), 229-247.

Lukeš, M., Zouhar, J. (2013). No Experience? No Problem – It's all about yourself: Factors Influencing Nascent Entrepreneurship Outcomes. *Ekonomický časopis*, 61(9), 934–950.

Martinčík, D. (2008). Ekonomicko-sociální úroveň krajů: komplexní srovnávací analýza. *E+M Ekonomie a Management,* 1, 14-25.

Matejovsky, L., Mohapatra, S., & Steiner, B. (2014). The dynamic effects of entrepreneurship on regional economic growth: Evidence from Canada. *Growth and Change*, *45*(4), 611-639.

Mateut, S. (2017). Subsidies, financial constraints and firm innovative activities in emerging economies. *Small Business Economics*. (in print)

Menčlová, B. (2014). Economic Development and Number of Business Entities. *Český finanční a účetní časopis*, *2014*(4), 166-174.

Ministry of Industry and Trade (2016a). Programme START. Available from www: < http://www.mpo-oppi.cz/start/>. Accessed on 5 August 2016.

Ministry of Industry and Trade (2016b). List of Supported Companies. Available from www: < http://www.mpo.cz/dokument141459.html>. Accessed on 5 August 2016.

Ministry of Labour and Social Affairs (2015). *Statistická ročenka trhu práce v České republice 2015*, Accessed on 5 August 2016. www: < https://portal.mpsv.cz/sz/stat/stro/rocenka2015.pdf. >.

Ministry of Labour and Social Affairs (2016a). *Společensky účelná pracovní místa*, Accessed on 17th October 2016. www: < https://portal.mpsv.cz/upcr/kp/jhm/apz. >.

Mirošník, K., Čadil, J., & Čermáková, K. (2016). Small business and cohesion policy-statistical evidence from the Czech Republic. *International Journal of Entrepreneurship and Small Business*, *29*(3), 398-415.

Nissan, E., Martín, M. Á. G., & Picazo, M. T. M. (2011). Relationship between organizations, institutions, entrepreneurship and economic growth process. *International Entrepreneurship and Management Journal*, *7*(3), 311-324.

North, D.C. (1990). *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, Cambridge.

Oh, I., Lee, J. D., Heshmati, A., & Choi, G. G. (2009). Evaluation of credit guarantee policy using propensity score matching. *Small Business Economics*, *33*(3), 335-351.

Paul Dana, L. (2000). The hare and the tortoise of former Czechoslovakia: reform and enterprise in the Czech and Slovak Republics. *European Business Review*, *12*(6), 337-344.

Parker, S. C. (2009). *The economics of entrepreneurship*. Cambridge University Press.

Parker, S. C., & Van Praag, C. M. (2006). Schooling, capital constraints, and entrepreneurial performance: The endogenous triangle. *Journal of Business & Economic Statistics*, *24*(4), 416-431.

Pergelova, A., & Angulo-Ruiz, F. (2014). The impact of government financial support on the performance of new firms: the role of competitive advantage as an intermediate outcome. *Entrepreneurship & Regional Development*, *26*(9-10), 663-705.

Polok, D., Michalski, P., Szewczyk, D., Keil, D., Wieczore, S., Kaciakova, P., Incze, Z., Rycerz, J., Nisztuk, T., Dvouletý, O., Krzemiński, P. (2016). *Future of the Visegrad Group*. Retrieved September 20, 2016, from http://paga.org.pl/projekty/raport-future-of-the-visegrad-group/future-of-the-visegrad-group/report?lang=en

Potluka, O., Brůha, J., Špaček, M., Vrbová, L. (2016). Counterfactual Impact Evaluation on EU Cohesion Policy Interventions in Training in Companies. *Ekonomický časopis* 64(6), 575-595.

Reynolds, P., Bosma, N., Autio, E., Hunt, S., De Bono, N., Servais, A., Lopez-Garcia, P., Chin, N. (2005). Global Entrepreneurship Monitor: Data Collection Design and Implementation 1998–2003, *Small Business Economics*, 24(3), pp. 205–231.

Roig-Tierno, N., Alcázar, J., & Ribeiro-Navarrete, S. (2015). Use of infrastructures to support innovative entrepreneurship and business growth. *Journal of Business Research*, *68*(11), 2290-2294.

Sanders, M. (2007). Scientific paradigms, entrepreneurial opportunities and cycles in economic growth. *Small Business Economics*, *28*(4), 339-354.

Shaffer, S., Hasan, I., & Zhou, M. (2015). New small firms and dimensions of economic performance. *Economic Development Quarterly*, 29(1), pp. 65-78.

Shane, S. A. (2007). *Economic development through entrepreneurship: Government, university and business linkages*. Edward Elgar Publishing.

Shane, S. (2009). Why encouraging more people to become entrepreneurs is bad public policy. *Small business economics*, *33*(2), 141-149.

Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of management review*, *25*(1), 217-226.

Schäffler, J., Hecht, V., & Moritz, M. (2016). Regional determinants of German FDI in the Czech Republic: new evidence on the role of border regions. *Regional Studies*, 1-13.

Shneor, R., Jenssen, J. I., & Vissak, T. (2016). Introduction to the special issue: Current challenges and future prospects of entrepreneurship in Nordic and Baltic Europe. *Baltic Journal of Management*, *11*(2), 134-141.

Simoes, N., Crespo, N., & Moreira, S. B. (2016). Individual determinants of self-employment entry: What do we really know?. *Journal of economic surveys*, *30*(4), 783-806.

Soukup, T. (2011). Profiling-Predicting Long-Term Unemployment at the Individual Level. *Central European Journal of Public Policy*, *5*(1), 118-142.

Srholec, M., & Žížalová, P. (2014). Mapping the Geography of R&D: What Can We Learn for Regional Innovation Policy in the Czech Republic and Beyond?. *European Planning Studies*, *22*(9), 1862-1878.

Stonkute, E., & Vveinhardt, J. (2017). Rural Development Policy Incentives encouraging Entrepreneurship in selected EU Countries. *Economic Science for Rural Development Conference Proceedings* (No. 44), 197-204.

Svallfors, S. (2003). Welfare regimes and welfare opinions: A comparison of eight western countries. *Social Indicators Research, 64*(3), 495-520.

Šebestová, J., Klepek, M., Čemerková, Š., & Adámek, P. (2015). Regional Entrepreneurship Culture and the Business Lifecycle: Patterns from the Moravian-Silesian Region. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *63*(6), 2137-2144.

Thurik, A. R. (1995). *Small firms, entrepreneurship and economic growth*. Tinbergen Institute.

Thurik, A. R. (2009). Entreprenomics: entrepreneurship, economic growth and policy. *Entrepreneurship, growth and public policy*, 219-249.

Thurik, A. R., Carree, M. A., Van Stel, A., & Audretsch, D. B. (2008). Does self-employment reduce unemployment? *Journal of Business Venturing*, *23*(6), 673-686.

Toma, S. G., Grigore, A. M., & Marinescu, P. (2014). Economic development and entrepreneurship. *Procedia Economics and Finance*, *8*, pp. 436-443.

Van Praag, C. M., & Versloot, P. H. (2007). What is the value of entrepreneurship? A review of recent research. *Small business economics*, *29*(4), 351-382.

Van Praag, M., & van Stel, A. (2013). The more business owners, the merrier? The role of tertiary education. *Small Business Economics*, *41*(2), 335-357.

Van Stel, A., & Storey, D. (2004). The link between firm births and job creation: Is there a Upas tree effect? *Regional Studies*, *38*(8), 893-909.

Van Stel, A., Storey, D. J., & Thurik, A. R. (2007). The effect of business regulations on nascent and young business entrepreneurship. *Small Business Economics*, *28*(2), 171-186.

Van Stel, A., & Suddle, K. (2008). The impact of new firm formation on regional development in the Netherlands. *Small Business Economics*, 30(1), 31-47.

Vogel, J. (2003). Towards a typology of European welfare production: Summary and discussion. *Social Indicators Research*, *64*(3), 547-572.

Welter, F., & Smallbone, D. (2011). *Handbook of research on entrepreneurship policies in central and eastern Europe*. Edward Elgar Publishing.

Wennekers, S., & Thurik, R. (1999). Linking entrepreneurship and economic growth. *Small business economics*, *13*(1), 27-56.

Wennekers, S., Van Wennekers, A., Thurik, R., & Reynolds, P. (2005). Nascent entrepreneurship and the level of economic development. *Small business economics*, *24*(3), 293-309.

Wolff, J., Nivorozhkin, A., & Bernhard, S. (2016). You can go your own way! The long-term effectiveness of a self-employment programme for welfare recipients in Germany, *International Journal of Social Welfare*, *25*(2), 136–148.

Zimmermannová, J., Skalickova, J., & Siroky, J. (2016). What can tax revenues tell us about the economic activity of regions? *Economics & Sociology*, *9*(1), 114.

Zouhar, J, & Lukeš, M. (2015). Factors influencing nascent entrepreneurship of the unemployed: The role of labor market policies, *Academy of Management Proceedings, 2015*(1), 18476.

Zouhar, J. Lukeš, M., Hörisch, F., Tosun, J. & Shore J. (2015). *The Impact of Labour Market Policy on Entrepreneurial Activities. CUPESSE Policy Brief No. 2.* 2015.

Žambochová, M. (2013). A statistical analysis of the support for small business as a solution for unemployment in the region Ústí nad Labem. *Liberec Economic Forum 2013: Proceedings of the 11th International Conference*, 642-651.

3. Determinants of Nordic Entrepreneurship[4]

Abstract

Purpose – The purpose of this paper is to analyse the determinants of entrepreneurial activity in the Nordic countries over the period of years 2004-2013 to provide supportive material for the Nordic entrepreneurial policy makers with specific focus on the role of necessity/opportunity-driven entrepreneurship, administrative barriers and the research and development (R&D) sector.

Design/methodology/approach – Quantitative study employed panel regression analysis with fixed effects estimator to test the impact of determinants on entrepreneurial activity operationalized as a rate of registered business activity and as an established business ownership rate.

Findings – The results obtained for the both dependent variables did not substantially differ from each other or the supported hypothesis stating a positive relationship between unemployment rate, GDP per capita and entrepreneurial activity. Also a negative impact of administrative barriers was found. However, no statistically significant positive impact of the R&D sector was observed.

Practical implications – Nordic entrepreneurial policy makers should put more effort into the reduction of administrative barriers towards founding enterprises and support entrepreneurship during the times of higher unemployment rates. Further evaluation of Nordic R&D policies is strongly needed, since no positive impacts towards entrepreneurship were found.

Originality/value – The empirical analysis was conducted based on the research gap in the studies related to the Nordic entrepreneurial policies and perceived need for the policy recommendations that are provided.

3.1. *Introduction*

Promoting entrepreneurship has recently become one of the key targets of the European Union's cohesion policy (European Commission, 2016). Entrepreneurship is considered by researchers, public authorities and stakeholders as a source of new job opportunities and as a significant determinant of economic growth. Positive contributions of entrepreneurship towards the growth of a country's gross domestic product (GDP) were proven by previous scholars in entrepreneurial studies (e.g. Thurik, 1995; Berkowitz and DeJong, 2005; Van Praag and Versloot, 2007; Polok et al., 2016; Acs et al., 2016). Gartner (1985) stated that entrepreneurship is a multi-dimensional phenomenon which should be studied from different perspectives and with all its complexities. The importance of studying the regional differences in the distribution of enterprises and factors that lead to its increase were also mentioned by Karlsson et al. (1993). Different levels of analysis are usually being conducted, such as investigations on the micro (individual), meso (industry or region) or macro (country or group of countries) level. It is therefore relevant to study which factors contribute to the growth of entrepreneurship because these factors may vary over time and across countries (Koellinger and Thurik, 2012). The recent contributions investigating the determinants of entrepreneurship on the country or regional level (e.g. Carbonara et al., 2016; Cueto et al., 2015; Dvouletý and Mareš, 2016a, b) illustrate that the topic of determinants of entrepreneurship is still not fully explored and requires further research attention.

For the group of Nordic countries (Denmark, Finland, Iceland, Norway and Sweden), which is the subject of interest in this particular study, there were several attempts to monitor and study entrepreneurial activity; however, a recent study of the determinants of entrepreneurship is still missing (Norden, 2013). Nordic "welfare states" are commonly distinguished from the rest of the world through the high share of the public sector, well-developed social security systems and high levels of social solidarity with a strong focus on social parity and equality of opportunities (e.g. Hjorth, 2008; Svallfors, 2003; Ahl et al.,

2016). Nordic countries have their specificities not only from the view of historical and sociocultural aspects, but also from the perspective of entrepreneurship and its research (Kuckertz et al., 2015).

The Nordic region reports on average lower rates of entrepreneurial intentions, lower rates of early stage entrepreneurial activity and even lower rates of established entrepreneurial activity in comparison with European and American countries (Gatewood et al., 2014). According to the Global Entrepreneurship Monitor (GEM) (2016) on average 6.6 per cent of the Nordic population was engaged in entrepreneurship during the period of years 2004-2013. Most people start a business entity in their 30s and only very few of them engage in entrepreneurship while they are young (e.g. Shneor et al., 2016; Vogel, 2003). The low presence of young entrepreneurs may be, according to Nordic researchers, caused by the lack entrepreneurial capabilities, business skills and lack of funding. Nordic countries are also often described as having low-risk acceptance rates. Significant influence on entrepreneurial activity comes also from the state-governed regulations and administrative barriers (e.g. Bulanova et al., 2016; Shneor et al., 2016).

The specificities of Nordic entrepreneurial research, potential diversity in the impact of traditional entrepreneurial determinants and the perceived need to study Nordic region as an entrepreneurial ecosystem have become the motivation for this research. Moreover, Nordic entrepreneurial research originated in business administration and therefore is most frequently represented in empirical studies by methods of qualitative research (e.g. case studies, interviews or narratives). According to the Nordic scientists (e.g. Hjorth and Steyaert, 2008; Hjorth, 2008), there is a substantial research gap in application of quantitative methods, which are suitable to explore the Nordic entrepreneurial ecosystem from the aggregated point of view.

The aim of this paper is hence to fill the research gap by conducting quantitative analysis of the determinants in the Nordic region for the period of years 2004-2013 and by the quantification of the relationships between entrepreneurial activity, unemployment rate, administrative barriers of entrepreneurship, GDP per capita and the research and

development (R&D) sector. Results of the analysis serve as a tool, argument and a source for the more appropriate targeting of entrepreneurial policies in the Nordic countries.

In Section 2, dedicated to the theoretical background, the previous studies related to the determinants of entrepreneurship are introduced, followed by Section 3, where the methods and the tested hypotheses are presented. After the methods and tested hypotheses are described to the reader, the variables together with their summary statistics and the results of the stationarity testing are reported in Section 4. Once the data set is prepared for the regression analysis, the econometric models are estimated in Section 5 to fulfill the main aim of the paper and to analyse the determinants of entrepreneurial activity, which is operationalized in two ways: rate of registered businesses and established ownership rate. The hypotheses are evaluated and the main results, together with the policy recommendations, are highlighted in the conclusions.

3.2. *Theoretical Background*

The theoretical background is divided into two parts, where the first part deals with the theoretical and empirical findings of previous entrepreneurship scholars investigating the determinants of entrepreneurship and therefore serves as an important guidance for our own stated hypotheses and applied approach. The second part is more focussed on entrepreneurship in the context of Nordic countries and presents findings of existing research.

3.2.1. Determinants of Entrepreneurship

One of the first empirical studies focussed on the determinants of entrepreneurship was written by Karlsson et al. (1993), who mention that entrepreneurs are closely related to their surroundings, reflected by the socio, economic and cultural variables. According to their research, the distribution of enterprises is influenced by the variables categorized into the four models: market, resource, milieu and career model. The market model is focussed on demand characteristics, market conditions, marketing and the establishment of networks. The market model was operationalized mainly through population density and GDP per capita. The second suggested model is the resource model, reflecting the resource-based view (RBV) on entrepreneurship, stating that the more resources individuals have the more probably they engage into entrepreneurial activity (Coleman, 1988). Quantification of the resource model's variables was done by Karlsson et al. (1993) mainly through the proportion of families having a house, share of population with a tertiary education, public expenditures for regional development and regional industry support. The milieumodel tries to cover the socioeconomic variability, creativity and investments in leisure and culture. The main important variables were share of population employed in artistic professions, location of universities, cultural institutions and share of foreigners. The fourth model was the career model, depicting the situation in the labour market, as well as sociobiological and sociocultural factors. The most important variables of the career model were unemployment rate, proportion of employees in manufacturing industry, ratio between existing businessmen and households and share of employees in small firms. As for the methods, regression analysis was used. According to their results, the model explaining the highest level of variability of the dependent variable, newly established entrepreneurial activity per thousand of households, was the market model. Karlsson et al. (1993) confirmed the positive relationship with entrepreneurial activity between GDP per capita, population with tertiary education, public expenditures for regional development and the share of economically active population.

Grilo and Thurik (2004) divide the determinants of entrepreneurship into the supply and demand side. The supply side is determined by the population's characteristics, such as size, growth, age and education structure, population density and share of immigrants. The economic development, globalization and the stage of technological development are considered as for the demand side of entrepreneurship. Their main conclusion was that the lack of financial resources does not have any impact on entrepreneurial activity.

Associations among the variables are usually empirically tested by econometric methods, specifically by regression analysis, as it was done in the study conducted by Wennekers et al. (2005), who tested the impact of explanatory variables (GDP per capita, secondary and tertiary education and variety of control variables) on the gross inflow into entrepreneurship measured by the Global Entrepreneurship Monitor. The authors conclude that entrepreneurial dynamics are related to economic development and differ across the economic development of countries; however, it is significantly affected by the quality of both population and governments.

The quality of business, governmental and cultural environments affect the level of entrepreneurial activity, as previously described by entrepreneurship scholars using the theory of institutions (e.g. Bruton et al., 2010) introduced by North (1990). North (1990) explains that formal instructions aim to reduce transaction costs, contrary to informal institutions which decrease uncertainty in the society. According to previous research, both formal (e.g. regulations, procedures, start-up costs, procedures needed to set up an enterprise, access to credit, taxes) and informal (e.g. culture, corruption perceptions, attitudes towards entrepreneurs, entrepreneurship perceptions) institutions have influence on entrepreneurship. A bad environment and institutions may therefore discourage entrepreneurship; however, a good environment and institutions may encourage entrepreneurship (e.g. Aparicio et al., 2016; Bjørnskov and Foss, 2013; Nissan et al., 2011; Van Stel et al., 2007).

Negative impact of administrative barriers, expressed as start-up costs or amount of procedures required to establish an enterprise, has been empirically supported by several

entrepreneurial scholars (e.g. Aparicio et al., 2016; Freytag and Thurik, 2007; Grilo and Thurik, 2004). A more difficult task is to operationalize informal institutions, as well as cultural and social norms. Previous research suggests to take into account proxy variables, such as life expectancy indices, expenditures on health, expenditures on culture, social spending or business and economic freedom indices (e.g. Giannetti and Simonov, 2004; Freytag and Thurik, 2007).

Dvouletý and Lukeš (2016) further discuss the importance of entrepreneurship policies. Policies focussed on self-employed may lead towards higher levels of entrepreneurial activity; however, policies focussed on high-growth enterprises may result in even higher economic growth and new job opportunities (Shane, 2007). A less direct approach of how to support entrepreneurship is through expenditures on R&D sector. According to Sanders (2007) or Aidis et al. (2008), investments into R&D create scientific knowledge and the new technological advancements of applied science bring new business opportunities that are further exploited by entrepreneurs and delivered to the market. Once the opportunities are exploited and commercialized, entrepreneurial activity increases. The R&D sector may also be operationalized through the rate of R&D institutions per capita (Dvouletý and Mareš, 2016a). Roig-Tierno et al. (2015) consider for the support infrastructure incubators, technology centres, and universities. Regarding their research, supportive infrastructure has the highest impact on innovative entrepreneurship. The aim of these institutions is to boost innovative activity and commercialize it as a product or service. The business sector has therefore interest in establishment of networks with these R&D institutions, which act within each other complementarily.

The relationship among unemployment rate, GDP per capita and entrepreneurship may vary across countries and over time, according to Grilo and Thurik (2004). The theoretical approach explaining different responses of actors towards regional economic development, classifies entrepreneurs into the two categories: necessity-driven entrepreneurs and opportunity-driven entrepreneurs. Necessity entrepreneurs Reynolds et al. (2005) call formerly unemployed individuals who become entrepreneurs because they do

not have any better alternative job opportunities. On the opposite, opportunity-driven entrepreneurs discover new business opportunities, bring innovation and strive for long-term sustainability of their businesses, high growth and future profits, when compared to their current employment opportunities. Necessity and opportunity-driven entrepreneurs differ, according to previous researchers, in several factors such as duration of entrepreneurship, job satisfaction, level of human capital and growth aspirations (e.g. Aparicio et al., 2016; Acs and Varga, 2005; Block and Sandner, 2009; Block and Koellinger, 2009). Since both forms of entrepreneurship are present in real economies, one needs to empirically observe, which form exceeds the other as can be seen in the following description.

When the overall economic performance of the country/region declines, the wages and salaries decrease and entrepreneurial activity declines because of the overall drop of aggregated demand. On the other hand, an increase in the unemployment rate forces individuals to create jobs for themselves to make a living by engagement in entrepreneurial activity, so there are two effects acting against each other and it is important to analyse which of them exceeds the other. However, once the economic performance turns around and the aggregated demand grows, necessity entrepreneurs perceive better alternative job opportunities in the labour market and withdraw from entrepreneurial activity contrary to opportunity entrepreneurs, driven by the new opportunities delivered by economic growth, engaging them towards entrepreneurship (Carree and Thurik, 2010). Baptista and Thurik (2007) argue that in some countries even the contradictory relationships may be empirically observed.

A more robust econometric approach to investigate the relationships between GDP per capita, unemployment rate and entrepreneurship was used by Koellinger and Thurik (2012). To test the relationships they estimate vector autoregressive models, regressions with the fixed effects and test Granger causality with up to a two-year lag because responses in the behaviour of agents in the economy may be sometimes delayed. Entrepreneurial activity was calculated as a registered (ownership) entrepreneurial activity per economically active person. Koellinger and Thurik (2012) conclude that the higher unemployment rate was

associated with the higher level of entrepreneurship. They also proved that the future trends in entrepreneurship help to predict economic fluctuations. Recent empirical contributions (e.g. Fritsch et al., 2015; Dvouletý and Mareš, 2016a, c) also report a positive impact of unemployment rate on entrepreneurial activity expressed as a rate of registered business or rate of new businesses. However, Cueto et al. (2015) state that this effect works only in the cases when unemployment rate increases significantly and when the regional employment opportunities are reduced substantially. The next section is dedicated to the entrepreneurial environment in the Nordic countries.

3.2.2. Entrepreneurship in the Nordic Countries

The Nordic region includes the countries of Denmark, Finland, Iceland, Norway and Sweden, sharing similarities from the historical, sociocultural and political perspectives According to the World Economic Forum (2016), the Nordic countries are among the economies that are driven by innovations. When it comes to entrepreneurship, based on the GEM (2016), on average 6.6 per cent of the Nordic population was engaged in entrepreneurial activity during the period of 2004-2013, where most of the entrepreneurs were middle aged, often older than 30 years and can be characterized by high levels of risk aversion (e.g. Shneor et al., 2016; Vogel, 2003; Hjorth, 2008). As already mentioned, the highest share of Nordic researchers study entrepreneurship from the qualitative perspectives and therefore there are not many studies offering an aggregated overview of Nordic entrepreneurship (e.g. Hjorth and Steyaert, 2008; Hjorth, 2008).

Some quantitative and overlooking approach is offered by the Nordic Knowledge Centre for Entrepreneurship, publishing research studies[1] and reports related to entrepreneurship and entrepreneurial policies (Norden, 2013). The latest published study related to entrepreneurial activity in the Nordic countries was focussed on the period of 2006-2009 and concludes that in the Nordic region, there is a relatively good level of start-up activity. As a supporting argument for that statement, the authors present that in a total of 602 gazelles, the fast growing young enterprises created 29,588 new jobs during the analysed period. The opposite opinion is shared by Gatewood et al. (2014), who note that the region

is characterized by the low level of entrepreneurial intentions and lower level of early and established entrepreneurial activity compared to other European and American countries.

When it comes to policy recommendations, researchers from Norden (2013) struggle with the lack of data reporting the population of active enterprises as was mentioned before by the previously introduced researchers in the field, and the authors work only with the registered business activity. Scholars feel the need to develop more nuanced, internationally comparable data and they also perceive a need to increase knowledge about Nordic entrepreneurial ecosystems.

Establishment of entrepreneurial ecosystems as a possible instrument for the stimulation of the growth of young firms in combination with effective regulatory framework is also suggested by Norden's (2013) researchers as an important step. More attention should also be paid to the role of Nordic universities, since entrepreneurs report lack of entrepreneurial capabilities and business skills needed for establishment of an enterprise. Nordic educational institutions should address their practical needs and transform according to the market requirements system of entrepreneurial education (Johannisson, 2016). The role of supportive entrepreneurial policies also needs to be challenged, since there are no studies assessing their impacts, despite the fact that their effect has been questioned recently (Fagerberg and Fosaas, 2014).

Governmental regulations and administrative barriers play a strong role in Nordic economies (e.g. Bulanova et al., 2016; Shneor et al., 2016). Despite the optimism of Norden's (2013) researchers, there are still regulatory and government framework issues linked to doing business in the Nordic countries presented in the latest Global Competitiveness Report (World Economic Forum, 2016). The five most problematic factors are depicted in Table I. Tax rates, restrictive labour regulations and inefficient government bureaucracy still belong to the main challenges and struggles of Nordic entrepreneurs.

Overall, Nordic scientists perceive a substantial lack of policy-related studies focussed on Nordic entrepreneurship as a tool providing supportive arguments for policy

makers, addressing them, identifying which framework conditions and policy areas influence the growth of entrepreneurship, and delivering answers to the direction of impact, both negative and positive. Evidence-driven policies, taking into account the economic development of the Nordic region, could provide support for entrepreneurs both during the times of economic recessions (self-employment policies), but also during the times of economic growth (entrepreneurial supportive policies). However, supporting materials delivering empirical experience for policy makers are still very rare (Norden, 2013).

Table I: The most problematic factors for doing business in Nordic countries

Problem ranking	Denmark	Finland	Iceland	Norway	Sweden
1	Tax rates	Tax rates	Foreign currency regulations	Restrictive labor regulations	Restrictive labor regulations
2	Complexity of tax regulations	Restrictive labor regulations	Tax rates	Insufficient capacity to innovate	Tax rates
3	Inefficient government bureaucracy	Complexity of tax regulations	Access to financing	Tax rates	Complexity of tax regulations
4	Access to financing	Inefficient government bureaucracy	Inflation	Inadequate supply of infrastructure	Inadequate supply of infrastructure
5	Restrictive labor regulations	Access to financing	Inefficient government bureaucracy	Inefficient government bureaucracy	Insufficient capacity to innovate

Source: World Economic Forum (2016), own elaboration

3.3. Methods and the Tested Hypotheses

In the previous paragraphs, I have pointed out that the determinants of entrepreneurship belong to the category of topics that are currently interesting for entrepreneurship scholars and I have also demonstrated that there is a perceived need for conducting quantitative empirical research in the Nordic countries, since not many research studies aimed at entrepreneurial policies were published recently. Also, I have revealed that the Nordic countries are very similar to each other in terms of entrepreneurial activity, institutions and environment, and therefore it is relevant to conduct for them a common empirical analysis following a quantitative research design which is presented on the following pages. In this

analysis, high attention was dedicated to the data collection. It was necessary to ensure that the collected variables are comparable over time and across the Nordic countries, as it is explained in Section 4. According to the knowledge and experience of the previous researchers, regression analysis is implemented. The econometric approach allows us to separately interpret the impact of the determinants on entrepreneurial activity over time and across the Nordic countries, keeping other factors constant. Econometric methods are applied in accordance to the previous research studies and econometric literature and the key assumptions of the used methods are explained and tested in the following text.

The purpose of this study is to investigate the determinants of entrepreneurial activity in the Nordic countries during the period of 2004-2013. The main emphasis is put on the response of the population of active enterprises to the economic development of the Nordic region to see whether the theories of necessity- and opportunity-driven entrepreneurship may be applied also for the Nordic countries. Based on previous research, the positive impact of an increase in GDP (bringing new opportunities) and the positive impact of unemployment (giving the unemployed an alternative way to earn a living via self-employment) are assumed (e.g. Aparicio et al., 2016; Carree and Thurik, 2010).

The role of formal institutions is investigated, where the main research interest is to quantify the association between administrative (business) barriers and entrepreneurial engagement. Previous studies (e.g. Freytag and Thurik, 2007; Grilo and Thurik, 2004) assume a negative and discouraging effect of the amount of administrative barriers and procedures required to establish a business on entrepreneurial activity. Another important representation of formal institutions in the research is influence of the R&D sector, promising new business opportunities originating from the creation of new scientific knowledge (Sanders, 2007), answering concern related to the role of the R&D sector in the Nordic region recently raised by Fagerberg and Fosaas (2014).

To ensure the consistency of obtained results, two approaches towards the quantification of entrepreneurial activity in the Nordic region are implemented. Following the approach of previous researchers, the key variables in the analysis are put into the

regression models with up to a two-year lag to observe the long-term impacts on entrepreneurship. To reduce potential endogeneity, several control variables were added to the empirical analysis. Based on the theoretical framework and work of the previous scholars, I form the following main hypotheses that are empirically tested:

H1. There is a positive relationship between unemployment rate and entrepreneurial activity.

H2. Administrative barriers negatively affect entrepreneurial activity.

H3. There is a positive relationship between GDP per capita and entrepreneurial activity.

H4. Entrepreneurs commercialize new knowledge produced by the researchers and, hence, there is a positive relationship between the R&D sector and entrepreneurial activity.

3.4. Data

This section aims to present the variables used in the regression analysis and introduce their sources and descriptive statistics. The presented variables depict the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) over the period of years 2004-2013 and were obtained from various sources. The variables are sorted into several groups according to their area. The first category of variables represents entrepreneurial activity in the Nordic countries, the second economic variables and the third category represents business environment and administrative barriers, respectively. The last part of this chapter is dedicated to testing the stationarity of variables to ensure that the econometric estimates are based on stationary variables.

3.4.1. Entrepreneurial Activity

There are many ways to quantify/operationalize entrepreneurship and use it as a variable for empirical research, since the data from population surveys such as the GEM (2016) still do not cover all years. This issue is challenged by researchers in different ways; one common approach is to express entrepreneurial activity as a ratio of population of registered businesses (Koellinger and Thurik, 2012; Norden, 2013; Dvouletý and Mareš, 2016a, c) or

new business registrations (Karlsson et al., 1993; Fritsch et al., 2015) and population (15-64 or 18-64 years).

In this work, I have calculated the rate of registered businesses per hundred of inhabitants aged 15-64 years. The applied formula for the calculation of entrepreneurial activity is given as follows (source: own elaboration): where entrepreneurial activity is the newly calculated variable (*ENTREPRENEURIAL_ACTIVITY*). The upper argument of the ratio is the population of active enterprises (*POPULATION_ACTIVE_ENT*) obtained from the Eurostat (2016)[2] database and with the cooperation of the national statistical offices of the Nordic countries (Statistics Denmark, 2016; Statistics Finland, 2016; Statistics Iceland, 2016; Statistics Norway, 2016; Statistics Sweden, 2016) to assure consistency of the data and their crosscountry comparison. The communication with the national statistical offices added some of the missing data and revealed that not all data reported by the national statistical offices are comparable. Therefore, I have decided to work only with the comparable data for the period of years 2004-2013. The lower argument of the formula represents the population aged 15-64 years collected from the World Bank (2016) database.

$$ENTREPRENEURIAL\_ACTIVITY = \frac{POPULATION\_ACTIVE\_ENT}{POPULATION\_15\_64} * 100$$

Entrepreneurial activity is the dependent variable used in the regression models and its descriptive statistics may be found in Table II. In Figure 1, I have calculated the average rate of entrepreneurial activity for the period of years 2004-2013 for each of the Nordic countries. The highest average level of entrepreneurial activity was, during the analysed period, in Iceland, Sweden and Norway. Since the rate is substantially higher for Iceland in comparison with the other Nordic countries, I consider Iceland as an outlier candidate and hence I estimate all econometric models also without Iceland to check whether the results differ.

Figure 1: Average Entrepreneurial activity during years 2004-2013

27,57
ICELAND

10,72
SWEDEN

7,72
FINLAND

8,32
NORWAY

5,88
DENMARK

Avg. Entrepren..
5,88   27,57
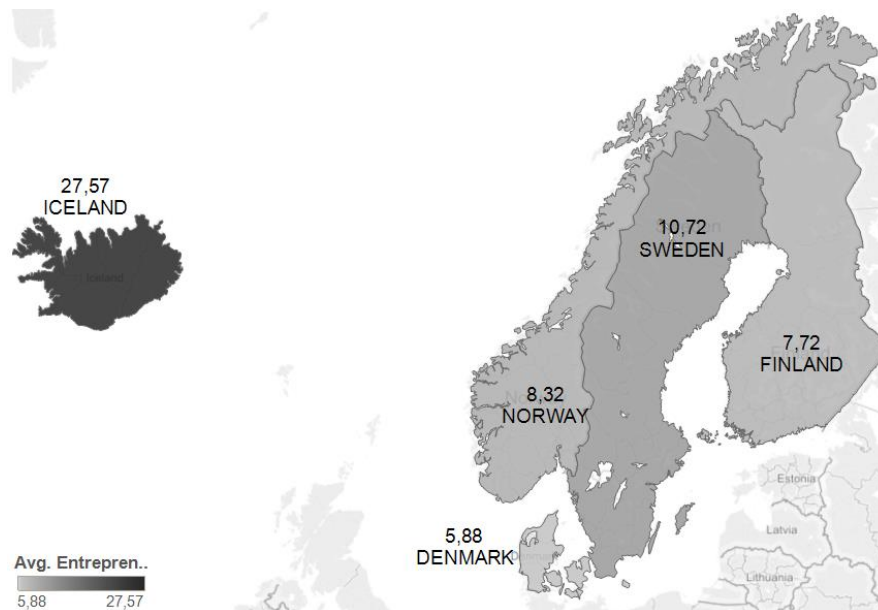
Source: Tableau, own elaboration

The second precaution that I apply to make sure that my results are not biased is the employment of a second way to measure entrepreneurial activity. Despite the fact that there are still many missing values in the population surveys of entrepreneurial activity conducted by the GEM's national teams (2016), I use the indicator reported by the GEM (2016) called established business ownership rate to estimate the control models at the end of the econometric analysis to check the reliability of the obtained results. This approach towards entrepreneurship is mentioned by Sternberg and Wennekers (2005). The variable established business ownership rate (*ESTABLISHED_OWNERSHIP_RATE*) represents according to the GEM (2016) the: "Percentage of 18-64 population who are currently ownermanager of an established business that has paid salaries, wages, or any other payments to the owners for more than 42 months". The descriptive statistics for the variable can be found in Table II, and Figure 2 is depicting the average rate of established ownership during the period of years 2004-2013 for those data that were available (6.6 per cent). One may observe that the highest average level of entrepreneurial activity was in Finland, Iceland and Norway. Both indicators

of entrepreneurial activity coincide that among the top-3 highest average levels of entrepreneurial activity are Iceland and Norway, which is a good sign of consistency of both indicators even if they differ about the third country.

Figure 2: Average Established Business Ownership Rate during years 2004-2013

3.4.2. Economic Variables

The economic variables in the model are represented by GDP per capita, unemployment rate, share of tertiary educated population and the R&D sector. The descriptive statistics for all the variables are presented in Table II. The main investigated variable is unemployment rate (*UNEMPLOYMENT_RATE*), expressed as the percentage of: "the labour force that is without work but available for and seeking employment", measured by the International Labour Organization and obtained from the World Bank (2016) database. Based on the findings of the previous scholars, I assume a positive relationship between unemployment rate and entrepreneurial activity, because during the times of high unemployment, people do not have enough job opportunities and engage in entrepreneurship to earn money to cover

their living costs. Once the economic development turns around and the unemployment rate decreases, entrepreneurial activity decreases because there are now better job opportunities in the labour market. The average unemployment rate in the Nordic countries during the analysed period was 5.8 per cent (median 6.3 per cent) as can be seen in Table II.

GDP per capita (*GDP_PER_CAPITA*) represents the economic development of a country in the constant 2005 US dollars obtained from the World Bank (2016) database. Based on the previous research, I assume a pro-cyclical relationship between GDP per capita and entrepreneurial activity, because economic growth brings to the economy new opportunities for new entrepreneurs and therefore the expected sign of estimated regression coefficient is positive. On average, the highest GDP per capita in the Nordic countries was in 2007.

The RBV on entrepreneurship is represented by the percentage share of tertiary educated population aged 15-64 years, obtained from Eurostat (2016), assuming that the more educated individuals are the more they probably engage in business activity, possessing a higher level of human capital. The densest concentration of tertiary educated population was in Norway. On average, 28.6 per cent of the Nordic countries' population had a tertiary education during the observed period (Table II).

The last pair of economic variables is connected to the R&D sector of the Nordic economies operationalized by the two variables obtained from the World Bank (2016) database. R&D scholars and scientists expect that with the increase of expenditures on R&D (*EXPENDITURES_RD*)[3] or an increase in the amount of R&D researchers (*RESEARCHERS_RD*)[4], the more knowledge will be produced and new entrepreneurs will deliver it to the markets and total entrepreneurial activity increases. Expenditures on R&D are expressed as a percentage share of GDP and the rate of R&D researchers was calculated per thousand of inhabitants aged 15-64 years (*RESEARCHERS_RD_RATE*). On average, 2.8 per cent of GDP in the Nordic countries was spent annually on R&D during the observed period (Table II).

3.4.3. Business Environment and Administrative Barriers Variables

The business environment and administrative barriers in the Nordic countries are represented by the following variables. The overall business conditions are operationalized by Business Freedom Index (*BUSINESS_FREEDOM_EFI*), calculated and published by the Heritage Foundation (2016). The Business Freedom Index is one of the components of Economic Freedom Index published by the same organization. According to the theoretical part, I assume that the higher business freedom is in the Nordic countries, the higher entrepreneurial activity will be in the Nordic region. From Table II, one may see that business freedom in the Nordic countries is very high; the average value of the index for the analysed period is 91.8 (median 94.6).

The World Bank's organization Doing Business (2016) collects information about start-up costs for new enterprises (*BUSINESS_START_UP_COSTS*)[5], the amount of needed procedures to register a new business (START_UP_PROCEDURES)[6] and the amount of days required to set up a business (*BUSINESS_START_DAYS*)[7]. The theoretical assumption for the regression models is that a decrease in the amount of procedures/costs/days is followed by an increase of entrepreneurial activity allowing individuals to more easily set up a new enterprise. According to Table II, on average 9.7 days (median 6.5 days) were required to found a new business in the Nordic countries during the analysed period.

Table II: Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Obs.
BUSINESS_FREEDOM_EFI	91.80400	94.60000	100.0000	70.00000	7.598871	50
BUSINESS_START_DAYS	9.690000	6.500000	18.00000	4.500000	4.797842	50
BUSINESS_START_UP_COSTS	1.336000	1.050000	3.300000	0.000000	1.054390	50
ECONOMICALY_ACTIVE_POP	3310848.	3530850.	6142836.	192797.3	1874582.	50
ENTREPRENEURIAL_ACTIVITY	12.04244	8.391473	30.02480	5.468290	8.042876	50
ESTABLISHED_OWNERSHIP_RATE	6.623084	6.646850	9.440000	3.348000	1.532744	44
EXPENDITURES_RD	2.771268	2.994555	3.748830	1.455980	0.724995	46
GDP_PER_CAPITA	51576.41	47967.92	69094.75	38045.13	9882.629	50
POPULATION_ACTIVE_ENT	290848.6	253214.5	736112.0	47560.00	198488.8	50
RESEARCHERS_RD	6303.544	6302.634	7975.619	4502.335	1109.401	46
RESEARCHERS_RD_RATE	0.610989	0.170159	3.952870	0.083286	1.179503	46
START_UP_PROCEDURES	3.970000	4.000000	5.000000	3.000000	0.877206	50

TERTIARY_EDUCATED_POP	28.56800	28.45000	34.20000	23.90000	2.535015	50
UNEMPLOYMENT_RATE	5.838000	6.300000	8.800000	2.300000	2.115915	50

Source: EViews, own elaboration

3.5. Stationarity of the Variables

The presented variables were formed into a panel structure, called also a longitudinal structure, pooling together the Nordic countries for the period of 2004-2013. This data structure combines the econometric characteristics of the time series and pooled crossed section data, allowing us to observe the series of states over time in a one data set (Wooldridge, 2002). The time series need to be stationary for the estimation of the econometric models; otherwise, biased estimates occur, documented as spurious regressions by Granger and Newbold (1974).

To test stationarity of the panel data, the unit root test is conducted for each of the variables. I work with the econometric software EViews 8 that has integrated Levin et al. (2002) test for the panel data with the automatic selection of the tested lags (based on the information criteria), testing the null hypothesis, that the variable is non-stationary. If the null hypothesis is rejected on the chosen level of statistical significance, one can accept the alternative hypothesis stating that the variable is stationary.

The results of the testing are presented in Table III. Unfortunately, not all of the variables were found to be stationary. As a remedy, the first panel differences were calculated for the two following variables: *TERTIARY_EDUCATED_POP* and *START_UP_PROCEDURES*. Subsequent testing of the growth form of the both variables (*TERTIARY_EDUCATED_POP_GROWTH*, *D_START_UP_PROCEDURES*) with the unit root test rejected on the 5 per cent level of the statistical significance the null hypothesis assuming non-stationarity and allowed me to accept the alternative hypothesis stating that the variables are stationary. Therefore, I put those two variables into the regression models in the growth form.

I conclude this section by the statement that all of the variables used for the econometric analysis satisfy the condition of stationarity at least on the 5 per cent level of the statistical significance and I do not expect bias in the sense of the spurious regression estimates.

Table 1: Stationarity Testing

Variable	Stat. significance	P-value	Result
BUSINESS_FREEDOM_EFI	5%	0.00	Stationary
BUSINESS_START_DAYS	5%	0.00	Stationary
BUSINESS_START_UP_COSTS	5%	0.00	Stationary
ESTABLISHED_OWNERSHIP_RATE	5%	0.00	Stationary
ENTREPRENEURIAL_ACTIVITY	5%	0.00	Stationary
EXPENDITURES_RD	5%	0.01	Stationary
GDP_PER_CAPITA	5%	0.00	Stationary
RESEARCHERS_RD_RATE	5%	0.00	Stationary
START_UP_PROCEDURES	5%	0.67	Non-stationary
D_START_UP_PROCEDURES	5%	0.00	Stationary
TERTIARY_EDUCATED_POP	5%	1.00	Non-stationary
TERTIARY_EDUCATED_POP_GROWTH	5%	0.00	Stationary
UNEMPLOYMENT_RATE	5%	0.00	Stationary

Source: EViews, own elaboration

3.6. Regression Analysis

In this chapter, first, the econometric approach towards the estimation of the regression models on the panel data is described; second, the main results of the econometric models investigating the determinants of entrepreneurial activity are interpreted. Finally, the control models with the dependent variable, established business ownership rate, are presented. The regression analysis allows us to quantify and analyse the relationships among the selected variables, choosing the explained (dependent) variable and several explanatory variables. The impact of explanatory variables on the dependent variable is interpreted through the estimated value of the coefficient of the variable following the assumption ceteris paribus [8] (Verbeek, 2012).

The regression models were estimated in the software EViews 8. As a first step when estimating the regression models on the panel data, the most appropriate technique of estimation needs to be selected. One needs to decide among the Pooled ordinary least squares method, the fixed effects estimator or the random effects estimator. The latter two approaches allow one to control for unobserved heterogeneity in the data. For the relatively stable units, such as the countries or regions, usually the fixed effects estimator is used. However, to decide about the most appropriate technique more formally, panel diagnostics' tests were run. After the estimation of the models with the fixed effects estimator, I tested the redundant fixed effects using the likelihood ratio test and on the 5 per cent level of statistical significance I rejected the null hypothesis stating that the fixed effects are redundant and I accepted the alternative one, stating that the fixed effects are the most appropriate estimation technique. The Hausman test also reported the results in favour of the fixed effects estimator (Verbeek, 2012).

Therefore all models were estimated with the fixed effects estimator; however, also control models with the Random Effects were estimated too to make sure that the obtained results are reliable, and the estimated signs of the coefficients did not substantially differ from those obtained by the fixed effects estimator. The presented models in Table IV were also estimated without the potential outlier, the country Iceland, and the estimations without Iceland did not significantly differ from those with Iceland and therefore Iceland was kept in the final modelling.

All econometric models were estimated with the White cross-section standard errors and covariance (d.f. corrected) which deal with the consequences of heteroscedasticity and autocorrelation, often present in the time series and panel data. All models were checked for the level of collinearity among the explanatory variables using the variance inflation factors test and all values were lower than the critical value of 10, and therefore the presented models do not suffer from the multicollinearity problem. The residuals taken from the models were tested for normality using the Jarque Bera normality test and on the 1 per cent level of the statistical significance I was unable to reject the null hypothesis stating the normal

distribution of the error term in the models and hence this statistical assumption is also satisfied. Finally, all estimated econometric models have a good explanatory power of the variability of the dependent variable in the terms of the R2 and all models were found to be statistically significant (Verbeek, 2012). Now a reader can proceed towards interpretation of the results which are presented in the model tables. The interpretation starts with the models depicted in Table IV.

3.6.1. Determinants of Entrepreneurial Activity

As was stated before, the econometric models depicted in Table IV were used to evaluate the impact of the determinants (explanatory variables) on the rate of registered business activity (entrepreneurial activity).

The estimated Models 1-3 were used to investigate the relationship between unemployment rate and entrepreneurial activity with unemployment rate lagged up to two years. For the quantified coefficients for the variables representing initial unemployment rate (Models 1, 4 and 5), lagged by one year (Model 2) and lagged by two years (Model 3), I was able to prove their statistical significance. All three coefficients had the positive sign, which can be interpreted as that during the analysed period the higher unemployment rate was associated with the higher level of entrepreneurial activity, even with up to a two-year lag, supporting **H1** claiming that in the times of higher unemployment rate, the Nordic inhabitants create jobs for themselves to obtain income by engaging in entrepreneurial activity. However, when the conditions in the labour market improve, individuals disengage from entrepreneurship because of better alternative opportunities on the labour market (necessity entrepreneurship). The positive impact of unemployment rate is in accordance with previously published studies by entrepreneurial scholars (e.g. Koellinger and Thurik, 2012; Fritsch et al., 2015; Dvouletý and Mareš, 2016a, c).

The relationship between administrative barriers and entrepreneurial activity was investigated mainly through the two variables, amount of days required to set up business and start-up costs for new enterprises decreasing the willingness of new entrepreneurs to

engage in entrepreneurial activity. The amount of days required to set up a business was tested with up to a two-year lag in Models 1-3 to observe whether administrative barriers have a long-term impact on entrepreneurial activity. All three coefficients (initial, lagged by one and two years) were found to be statistically significant and were negative. The increase in the amount of days required to set up a business was associated with a decrease of entrepreneurial activity and vice versa; the decrease in the amount of days required to set up a business was associated with the increase in entrepreneurial activity in the Nordic countries. The negative coefficient was also found to be statistically significant for the variable representing start-up costs for new enterprises (Model 5). The increase in the start-up costs was (during the analysed period) associated with the decrease of entrepreneurial activity, and the decrease in start-up costs was associated with the increase of entrepreneurial activity in the Nordic countries. Therefore, I accept **H2** and state that there was a negative relationship between entrepreneurial activity and administrative barriers in the Nordic countries during the period of years 2004-2013. In Model 4, I was able to prove a statistically significant positive impact of Business Freedom Index on entrepreneurial activity, explaining that higher business freedom led to growth of Nordic entrepreneurship. These findings support the role of institutions in entrepreneurial behaviour of Nordic inhabitants as previously discussed by Nordic researchers (e.g. Bulanova et al., 2016; Shneor et al., 2016) and moreover, deliver them empirical evidence of this relationship. The negative impact of discouraging institutions on entrepreneurial activity is also linked to results obtained by researchers from other countries (e.g. Aparicio et al., 2016; Freytag and Thurik, 2007; Grilo and Thurik, 2004).

Opportunity-driven entrepreneurship was tested for the Nordic countries in Models 1-3 with up to a two-year lag. For the quantified coefficients for the variables representing GDP per capita (Models 1 and 5), lagged by one year (Model 2) and two years (Model 3), I obtained positive statistically significant coefficients. For the analysed period I am able to accept **H3** stating that there is a positive relationship between GDP per capita and entrepreneurial activity. As it was explained and found by previous scholars (e.g. Albulescu and Tămăşilă, 2016; Koellinger and Thurik, 2012; Dvouletý and Mareš, 2016b), the increase

in entrepreneurial activity is driven by new opportunities brought by the economic growth of the Nordic countries.

Unfortunately, I was unable to confirm the statistically significant positive relationship between the growth of tertiary educated population and entrepreneurial activity described by the previous researchers (e.g. Karlsson et al., 1993; Coleman, 1988) through the RBV on entrepreneurship (Model 4). This finding supports Johannisson (2016) who argues that the Nordic system of entrepreneurial education does not provide entrepreneurs the requested skills and capabilities. Another explanation could be the high level of tertiary educated population in the Nordic countries over time or transformation of the variable into the growth level due to its stationarization.

Model 5 tested the relationship between the R&D sector and entrepreneurial activity assuming the application and commercialization of newly produced knowledge expressed as the rate of R&D researchers and expenditures on R&D suggested, for example, by Sanders (2007) or Aidis et al. (2008). Based on the estimated statistical significance of the obtained coefficients, I cannot reject the null hypothesis stating that the variables representing the R&D sector are statistically insignificant. Hence, **H4** could not be confirmed in this set of econometric models. This observation could support statements of Nordic researchers (e.g. Fagerberg and Fosaas, 2014), who point out that perhaps investments into the R&D sector do not necessarily have to boost Nordic entrepreneurship. The next section is dedicated to the interpretation of the control models with the dependent variable established business ownership rate presented in Table V.

Table IV: Model Table: The Determinants of Entrepreneurial Activity

Variable / Model	Model 1	Model 2	Model 3	Model 4	Model 5
Dependent variable	*ENTREPRENEURIAL_ACTIVITY*				
GDP_PER_CAPITA	**0.000377*****				**0.000270*****
	(7.64E-05)				(5.74E-05)
GDP_PER_CAPITA (-1)		**0.000325*****			
		(5.51E-05)			
GDP_PER_CAPITA (-2)			**0.000278*****		
			(4.91E-05)		
UNEMPLOYMENT_ RATE	**0.527779*****			**0.288808*****	**0.388050*****
	(0.072494)			(0.071640)	(0.062164)
UNEMPLOYMENT_ RATE (-1)		**0.466555*****			
		(0.042477)			
UNEMPLOYMENT_ RATE (-2)			**0.430999*****		
			(0.033425)		
BUSINESS_START_ DAYS	**-0.059950****				
	(0.029898)				
BUSINESS_START_ DAYS (-1)		**-0.044832****			
		(0.021112)			
BUSINESS_START_ DAYS (-2)			**-0.039851****		
			(0.015924)		
BUSINESS_START_ UP_COSTS					**-0.666260****
					(0.261255)
BUSINESS_ FREEDOM_EFI				**0.044165****	
				(0.021304)	
TERTIARY_EDUCA TION_GROWTH				**0.060138**	
				(0.260302)	
EXPENDITURES_ RD					**0.237863**
					(0.406312)
RESEARCHERS_ RD_RATE					**-1.827657**
					(1.477876)
CONSTANT	**-9.883321****	**-6.826896****	**-4.106910**	**6.345064*****	**-4.163884**
	(4.388369)	(3.093148)	(2.789167)	(2.220068)	(3.654348)
R-Squared	0.995120	0.996723	0.998042	0.994300	0.996321
Adj. R-squared	0.994306	0.996103	0.997614	0.993221	0.995402
F-statistic	1223.451	1607.797	2330.363	921.9570	1083.339
Observations	50	45	40	45	46

Source: EViews, own elaboration

3.6.2. Determinants of Established Ownership Rate

The robustness of the results obtained in the models with the dependent variable rate of registered business activity in the previous section was checked through the implementation of the second way to measure entrepreneurial activity expressed as established business ownership rate. Despite the missing values in the data set, I was able to quantify the teste relationships and estimate the three econometric models presented in Table V.

In the estimated models (Models 1-3), I was able to prove the statistically significant positive relationship between unemployment rate and entrepreneurial activity as was confirmed in the previous section and suggested by previous research (e.g. Koellinger and Thurik, 2012; Fritsch et al., 2015; Dvouletý and Mareš, 2016a, c). The increase in unemployment rate led to the increase in established business ownership rate during the analysed period in the Nordic countries, which supports **H1**.

The variables representing administrative barriers, the amount of days required to set up a business (Model 1) and start-up costs (Model 2), were both found to be statistically significant. The increase in start-up costs and the increase in the amount of days required to set up a business were associated with the decrease of established business ownership rate in the Nordic countries during the analysed period as already found by other empirical researchers (e.g. Aparicio et al., 2016; Freytag and Thurik, 2007; Grilo and Thurik, 2004), which can be used as a supportive argument to accept **H2**. Unfortunately, a statistically significant negative sign was obtained for the variable representing Business Freedom Index (Models 1-3), which is in contradiction to the previously obtained results and therefore needs to be further tested in the upcoming studies. Since the negative sign is not expected either in theory or by previous researchers, the only remaining explanation is that it is caused by the missing data in the established business ownership rate.

All depicted models (Models 1-3) also proved the statistically significant positive relationship between GDP per capita and entrepreneurial activity, which is also in agreement with the previous findings of entrepreneurship scholars (e.g. Albulescu and Tămăşilă, 2016; Koellinger and Thurik, 2012; Dvouletý and Mareš, 2016b) and results obtained in the first set of econometric estimates. Hence, the higher level of GDP per capita was associated with a higher level of entrepreneurial activity during the analysed period in the Nordic countries and this result supports **H3**.

In the previous estimated models as well as in the models estimated for established business ownership rate, no statistically significant variable supporting the impact of R&D sector on entrepreneurial activity (Models 1 and 2) was found. Therefore, no statistical evidence supporting **H4** was obtained and **H4** cannot be confirmed. No statistically significant support was obtained for the growth of tertiary educated population (Model 3) either as it was in the case of models estimated in the previous section revealing differences in the Nordic determinants of entrepreneurship, supported by Nordic scientists (e.g. Johannisson, 2016; Fagerberg and Fosaas, 2014).

I conclude the regression analysis with the statement that both measures of entrepreneurial activity used in the econometric models provided similar statistically significant results and results did not substantially differ from each other. Hence the obtained results do not look to be biased. The main outcome of the regression analysis is that hypotheses **H1-H3** were accepted; however, no statistical evidence was obtained for proving **H4**.

Table V: Model Table: The Determinants of Established Ownership Rate

Variable / Model	Model 1	Model 2	Model 3
Dependent variable	*ESTABLISHED_OWNERSHIP_RATE*		
GDP_PER_CAPITA	**0.000272***	**0.000321***	**0.000397***
	(9.04E-05)	(0.000103)	(0.000107)
UNEMPLOYMENT_RATE	**0.270821***	**0.362017***	**0.331521***
	(0.098423)	(0.104363)	(0.077072)
BUSINESS_START_DAYS	**-0.120545***		**-1.011698***
	(0.066459)		(0.302778)
BUSINESS_START_UP_COSTS		**-1.580947***	
		(0.520646)	
BUSINESS_FREEDOM_EFI	**-0.054643**	**-0.071545***	**-0.084485***
	(0.022959)	(0.019416)	(0.022282)
TERTIARY_EDUCATION_GROWTH			**-0.219576**
			(0.139152)
EXPENDITURES_RD	**0.315148**		
	(0.755287)		
RESEARCHERS_RD_RATE		**0.418509**	
		(2.581762)	
CONSTANT	**-3.619160**	**-3.751091**	**1.797146**
	(5.648860)	(6.639659)	(4.606941)
R-Squared	0.743330	0.758948	0.795782
Adj. R-squared	0.671142	0.691152	0.732404
F-statistic	10.29710	11.19458	12.55610
Observations	42	42	39
Note: Standard Errors are in parentheses *** stat. significance on 1%, ** stat. significance on 5%, * stat. significance on 10%.			

Source: EViews, own elaboration

3.7.   Conclusion

This paper was written in the context of the European Union's cohesion policy promoting entrepreneurship as a source of the EU countries' competitiveness and economic growth (European Commission, 2016). The main aim of the study was to analyse the determinants of entrepreneurial activity in the Nordic countries over the period of years 2004-2013. The empirical analysis was conducted based on the research gap in the studies related to the Nordic entrepreneurial policies and perceived need for supporting materials helping to form

the Nordic entrepreneurial policies (Norden, 2013). The main distinction of the Nordic welfare states from the rest of the world is the strong role of the public sector and governmental institutions which may affect the results obtained by entrepreneurial research and provide differences in traditional entrepreneurial patterns (Kuckertz et al., 2015). Another motivation for this quantitative study was to offer complementarily insight from the quantitative perspective and overview of Nordic entrepreneurship, since most Nordic entrepreneurial studies use a qualitative methodology (e.g. Hjorth and Steyaert, 2008; Hjorth, 2008).

The paper sums up the previous empirical findings of entrepreneurship scholars and follows the methodology of the previous researchers in entrepreneurship by implementation of the econometric approach towards the evaluation of the stated hypotheses (Koellinger and Thurik, 2012). Nordic entrepreneurial activity was quantified by the two variables, rate of registered business activity and established business ownership rate, to mitigate potential biases caused by operationalization of entrepreneurship through the registered business activity. Data were obtained from the various databases and were formed into a panel data set. For each entrepreneurial activity, acting as the dependent variable, was estimated a set of econometric models following the fixed effects estimator approach. For the main explanatory variables, unemployment rate, administrative barriers and GDP per capita were tested including with relationships with up to a two-year lag to analyse the long-run impacts on Nordic entrepreneurship.

The results obtained for both dependent variables did not substantially differ from each other and were generally in agreement with the previous entrepreneurial research. The hypothesis stating that there was a positive relationship between unemployment rate and entrepreneurial activity during the analysed period was supported and also consistent with previous empirical studies (e.g. Koellinger and Thurik, 2012; Fritsch et al., 2015; Dvouletý and Mareš, 2016a, c). The statistically significant negative impact of administrative barriers, acting as discouraging formal institutions, on entrepreneurial activity was also expected, according to reported findings by other scholars (e.g. Aparicio et al., 2016; Freytag and

Thurik, 2007; Grilo and Thurik, 2004). The third tested hypothesis assuming a positive relationship between GDP per capita and entrepreneurial activity was also confirmed and the obtained results were consistent with the previous research studies assuming existence of opportunity-driven entrepreneurship (e.g. Albulescu and Tămăşilă, 2016; Koellinger and Thurik, 2012; Dvouletý and Mareš, 2016b).

Contrary to previous researchers such as Roig-Tierno et al. (2015), no empirical evidence was obtained to support the hypothesis assuming a positive relationship between the R&D sector and entrepreneurial activity. Fagerberg and Fosaas (2014) are among those researchers who point out that perhaps capacities and distributed resources towards the Nordic R&D sector do not produce as many innovations as could be produced with the mos efficient usage of allocated resources. Fagerberg and Fosaas (2014) also highlight the importance of learning from past failures of "science policies", "technology policies" or "industrial policies" implemented in the Nordic region, which today are called innovation policies. Based on my findings, I encourage scientists to further continue with the evaluation of innovative policies in the Nordic region to shed more light on the real outcomes of the Nordic R&D policies, especially those studies assessing the impact on entrepreneurial activity (e.g. Dvouletý and Lukeš, 2016). The obtained experience should serve for continuous building of an innovation boosting ecosystem, where the Nordic universities play a crucial role. Transformation and revision of Nordic entrepreneurial education should be a priority, since no positive impact of tertiary education on entrepreneurial activity was obtained. Needed change in entrepreneurial education should cover delivery of key business competencies and skills needed by current and future entrepreneurs (Johannisson, 2016).

The obtained results from the regression models, together with the Global Competitiveness Report, suggest to the Nordic entrepreneurial policy makers to put more effort into the reduction of administrative barriers towards founding enterprises in the Nordic countries (World Economic Forum, 2016) despite the fact that significant reduction of administrative barriers has been done already (Norden, 2013). The entrepreneurial ecosystem in the Nordic region needs to be built on an effective and business friendly

legislation framework with effective regulatory authorities. Also more attention should be paid to the Nordic universities and the R&D research centres as important backbone institutions of the entrepreneurial ecosystem since no positive statistically significant impact on entrepreneurial activity has been proven. The supportive infrastructure should be more focussed on the strong cooperation among the research centres, universities, science parks, business incubators and governmental institutions (e.g. Norden, 2013; Sanders, 2007).

The limitation, which has to be taken into account when interpreting the results of the analysis, is dedicated to the limited data for the population of active enterprises in the Nordic countries together with the restricted analysed period of years 2004-2013. If the researchers are asked to provide the supporting empirical materials for the decision makers about the entrepreneurial policies, they need to be equipped with detailed and comparable data across the Nordic countries, preferably on a quarterly or monthly basis. Also the data need to be reported as soon as possible, since the analysis needs to be conducted in real time to provide supportive materials once they are requested. This is one clear limitation, and at the same time, a recommendation for Nordic policy makers, which was already stressed by Norden (2013). Any attempts to monitor entrepreneurial activity, such as the Nordic Entrepreneurship Monitor (Norden, 2010) or participation of the national teams in the GEM (2016) should also be further supported. More efforts also need to be put into data collection on the levels of lower administrative units, such as NUTS 3 or LAU 1 to make a connection to the current trend in entrepreneurial research, investigating the role of entrepreneurial activity on the regional level (e.g. Audretsch et al., 2015; Carree et al., 2015).

An additional policy recommendation related to the economic development of the Nordic region, based on obtained results suggests, to Nordic entrepreneurial policy makers to support entrepreneurship especially during the times of higher unemployment rates to offer Nordic individuals an alternative exit from unemployment into self-employment. Concrete policy tools may include entrepreneurial education, such as trainings and workshops, direct subsidies for unemployed or allocation of more resources towards the

entrepreneurial infrastructure, such as science parks and business incubators (e.g. Fritsch et al., 2015; Dvouletý and Lukeš, 2016).

Upcoming Nordic entrepreneurial research should continue in studying entrepreneurial activity from the aggregated perspective with employment of quantitative methods. Evaluation of the impact of additional control variables representing determinants of entrepreneurship to support the presented findings could be one research challenge. Investigation of entrepreneurial activity on the lower, regional administrative levels could also be a way how to contribute towards Nordic entrepreneurial knowledge. Another suggestion for future researchers is to take into account different forms of entrepreneurship, such as business companies and self-employed and to study them separately, since both have their own specificities (e.g. Shaffer et al., 2015).

3.8.   Notes

1. Nordic Entrepreneurship Monitor 2010 (Norden, 2010).

2. "Population of active enterprises in particular year in Industry and services (except management activities of holding companies; public administration and community services; activities of households and extra-territorial organizations)" (Eurostat, 2016).

3. "Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development" (World Bank, 2016).

4. "Researchers in R&D are professionals engaged in the conception or creation of new knowledge, products, processes, methods, or systems and in the management of the projects concerned. Postgraduate PhD students (ISCED97 level 6) engaged in R&D are included" (World Bank, 2016).

5. "Cost to register a business is normalized by presenting it as a percentage of gross national income (GNI) per capita" (World Bank, 2016).

6. "Start-up procedures are those required to start a business, including interactions to obtain necessary permits and licenses and to complete all inscriptions, verifications, and notifications to start operations. Data are for businesses with specific characteristics of ownership, size, and type of production" (World Bank, 2016).

7. "Time required to start a business is the number of calendar days needed to complete the procedures to legally operate a business. If a procedure can be speeded up at additional cost, the fastest procedure, independent of cost, is chosen" (World Bank 2016).

8. Under the condition that the other variables are kept constant.

3.9.   References

Acs, Z.J. and Varga, A. (2005), "Entrepreneurship, agglomeration and technological change", *Small Business Economics*, Vol. 24 No. 3, pp. 323-334.

Acs, Z.J., Szerb, L. and Autio, E. (Eds) (2016), "The global entrepreneurship and development index", *Global Entrepreneurship and Development Index 2015*, Springer International Publishing AG, Cham, pp. 11-31.

Ahl, H., Berglund, K., Pettersson, K. and Tillmar, M. (2016), "From feminism to FemInc.ism: on the uneasy relationship between feminism, entrepreneurship and the Nordic welfare state", *International Entrepreneurship and Management Journal*, Vol. 12 No. 2, pp. 369-392.

Aidis, R., Estrin, S. and Mickiewicz, T. (2008), "Institutions and entrepreneurship development in Russia: a comparative perspective", *Journal of Business Venturing*, Vol. 23 No. 6, pp. 656-672.

Albulescu, C.T. and Tămăşilă, M. (2016), "Exploring the role of FDI in enhancing the entrepreneurial activity in Europe: a panel data analysis", *International Entrepreneurship and Management Journal*, Vol. 12 No. 3, pp. 629-657.

Aparicio, S., Urbano, D. and Audretsch, D. (2016), "Institutional factors, opportunity entrepreneurship and economic growth: panel data evidence", *Technological Forecasting and Social Change*, Vol. 102 No. 1, pp. 45-61.

Audretsch, D.B., Belitski, M. and Desai, S. (2015), "Entrepreneurship and economic development in cities", *The Annals of Regional Science*, Vol. 55 No. 1, pp. 33-60.

Baptista, R. and Thurik, A.R. (2007), "The relationship between entrepreneurship and unemployment: is Portugal an outlier?", *Technological Forecasting and Social Change*, Vol. 74 No. 1, pp. 75-89.

Berkowitz, D. and DeJong, D.N. (2005), "Entrepreneurship and post-socialist growth", *Oxford Bulletin of Economics and Statistics*, Vol. 67 No. 1, pp. 25-46.

Bjørnskov, C. and Foss, N. (2013), "How strategic entrepreneurship and the institutional context drive economic growth", *Strategic Entrepreneurship Journal*, Vol. 7 No. 1, pp. 50-69.

Block, J. and Koellinger, P. (2009), "I can't get no satisfaction – necessity entrepreneurship and procedural utility", *Kyklos*, Vol. 62 No. 2, pp. 191-209.

Block, J. and Sandner, P. (2009), "Necessity and opportunity entrepreneurs and their duration in self-employment: evidence from German micro data", *Journal of Industry, Competition and Trade*, Vol. 9 No. 2, pp. 117-137.

Bruton, G.D., Ahlstrom, D. and Li, H.L. (2010), "Institutional theory and entrepreneurship: where are we now and where do we need to move in the future?", *Entrepreneurship Theory and Practice*, Vol. 34 No. 3, pp. 421-440.

Bulanova, O., Isaksen, E.J. and Kolvereid, L. (2016), "Growth aspirations among women entrepreneurs in high growth firms", *Baltic Journal of Management*, Vol. 11 No. 2, pp. 187-206.

Carbonara, E., Santarelli, E. and Tran, H.T. (2016), "De jure determinants of new firm formation: how the pillars of constitutions influence entrepreneurship", *Small Business Economics*, Vol. 47 No. 1, pp. 139-162.

Carree, M., Congregado, E., Golpe, A. and van Stel, A. (2015), "Self-employment and job generation in metropolitan areas, 1969-2009", *Entrepreneurship & Regional Development*, Vol. 27 Nos 3-4, pp. 181-201.

Carree, M.A. and Thurik, A.R. (2010), "The impact of entrepreneurship on economic growth", inAcs, Z.J. and Audretsch, D.B. (Eds), *Handbook of Entrepreneurship Research*, Springer, New York, NY, pp. 557-594.

Coleman, J. (1988), "Social capital in the creation of human capital", *American Journal of Sociology*, Vol. 94 No. 1, pp. S95-S120.

Cueto, B., Mayor, M. and Suárez, P. (2015), "Entrepreneurship and unemployment in Spain: a regional analysis", *Applied Economics Letters*, Vol. 22 No. 15, pp. 1230-1235.

Doing Business (2016), "Doing business", available at: www.doingbusiness.org/ (accessed 22 April 2016).

Dvouletý, O. and Lukeš, M. (2016), "Review of empirical studies on self-employment out of unemployment: do self-employment policies make a positive impact?", *International Review of Entrepreneurship*, Vol. 14 No. 3, pp. 361-376.

Dvouletý, O. and Mareš, J. (2016a), "Determinants of regional entrepreneurial activity in the Czech Republic", Economic Studies & Analyses/Acta VSFS, Vol. 10 No. 1, pp. 31-46.

Dvouletý, O. and Mareš, J. (2016b), "Entrepreneurial activity in the Czech regions: are business companies and self-employed individuals affected by the same factors?", paper presented at the *10th International Days of Statistics and Economics*, Prague, 8-10 September, available at: www.researchgate.net/publication/307599141_Entrepreneurial_Activity_in_the_Czech_Region_Are_Business_Companies_and_Self-employed_Individuals_Affected_by_the_Same_Factors (accessed 20 October 2016).

Dvouletý, O. and Mareš, J. (2016c), "Relationship between unemployment and entrepreneurial activity: evidence found among Visegrad countries", *Proceedings of the 4th International Conference: Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS)*, Prague, pp. 146-156.

European Commission (2016), "Entrepreneurship and small and medium-sized enterprises (SMEs)", available at: http://ec.europa.eu/growth/smes (accessed 22 April 2016). Eurostat. (2016), "Eurostat database", available at: http://ec.europa.eu/eurostat (accessed 22 April 2016).

Fagerberg, J. and Fosaas, M. (2014), "Innovation and innovation policy in the Nordic region", available at: www.feps-europe.eu/assets/a8bc47f5-7441-4f4a-ac8a-3b1d4a9f89fc/innovation.pdf (accessed 22 April 2016).

Freytag, A. and Thurik, R. (2007), "Entrepreneurship and its determinants in a cross-country setting", *Journal of Evolutionary Economics*, Vol. 17 No. 2, pp. 117-131.

Fritsch, M., Kritikos, A. and Pijnenburg, K. (2015), "Business cycles, unemployment and entrepreneurial entry – evidence from Germany", *International Entrepreneurship and Management Journal*, Vol. 11 No. 2, pp. 267-286.

Gartner, W. (1985), *Handbook of Entrepreneurial Dynamics: The Process of Business Creation*, Sage, Thousand Oaks, CA, p. xxvii.

Gatewood, E.J., Greene, P.G. and Thulin, P. (2014), "Sweden and the United States: differing entrepreneurial conditions require different policies", in Braunerhjelm, P. (Ed.), *20 years of Entrepreneurship Research, Swedish Entrepreneurship Forum*, Taberg, pp. 95-108.

Giannetti, M. and Simonov, A. (2004), "On the determinants of entrepreneurial activity: social norms, economic environment and individual characteristics", *Swedish Economic Policy Review*, Vol. 11 No. 2, pp. 269-313.

Global Entrepreneurship Monitor (GEM) (2016), "Global entrepreneurship monitor (GEM)", available at: www.gemconsortium.org/data (accessed 22 April 2016).

Granger, C. and Newbold, P. (1974), "Spurious regressions in econometrics", *Journal of Econometrics*, Vol. 2 No. 2, pp. 111-120.

Grilo, I. and Thurik, R. (2004), "Determinants of entrepreneurship in Europe", Working Paper No. ERS-2004-106-ORG, *ERIM Report Series*, Erasmus Research Institute of Management, Rotterdam.

Heritage Foundation (2016), "Business freedom index", available at: www.heritage.org/index (accessed 22 April 2016).

Hjorth, D. (2008), "Nordic entrepreneurship research", *Entrepreneurship Theory and Practice*, Vol. 32 No. 2, pp. 313-338.

Hjorth, D. and Steyaert, C. (2008), *The Politics and Aesthetics of Entrepreneurship*, Edward Elgar, Cheltenham.

Johannisson, B. (2016), "Limits to and prospects of entrepreneurship education in the academic context", *Entrepreneurship & Regional Development*, Vol. 28 Nos 5-6, pp. 403-423.

Karlsson, Ch., Johannisson, B. and Storey, D. (1993), *Small Business Dynamics: International, National, and Regional Perspectives, Routledge*, New York, NY, p. xiv.

Koellinger, P.D. and Thurik, A.R. (2012), "Entrepreneurship and the business cycle", *Review of Economics and Statistics*, Vol. 94 No. 4, pp. 1143-1156.

Kuckertz, A., Berger, E.S. and Allmendinger, M.P. (2015), "What drives entrepreneurship?", *Die Betriebswirtschaft – Business Administration Review*, Vol. 75 No. 4, pp. 273-288.

Levin, A., Lin, C.F. and Chu, J.C.S. (2002), "Unit root tests in panel data: asymptotic and finite-sample properties", *Journal of Econometrics*, Vol. 108 No. 1, pp. 1-24.

Nissan, E., Martín, M.Á.G. and Picazo, M.T.M. (2011), "Relationship between organizations, institutions, entrepreneurship and economic growth process", *International Entrepreneurship and Management Journal*, Vol. 7 No. 3, pp. 311-324.

Norden (2010), "Nordic entrepreneurship monitor 2010", available at: http://norden.divaportal.org/smash/record.jsf?pid=diva2%3A702654&dswid=2817 (accessed 22 April 2016).

Norden (2013), "Nordic growth entrepreneurship review 2012", available at: www.nordicinnovation.org/Publications/nordic-growth-entrepreneurship-review-2012 (accessed 22 April 2016).

North, D.C. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, Cambridge.

Polok, D.,Michalski, P., Szewczyk, D., Keil, D.,Wieczore, S., Kaciakova, P., Incze, Z., Rycerz, J., Nisztuk, T., Dvouletý, O. and Krzemiński, P. (2016), "Future of the Visegrad Group", available at: http://paga. org.pl/projekty/raport-future-of-the-visegrad-group/future-of-the-visegrad-group/report?lang=en (accessed 10 October 2016).

Reynolds, P., Bosma, N., Autio, E., Hunt, S., De Bono, N., Servais, A., Lopez-Garcia, P. and Chin, N. (2005), "Global entrepreneurship monitor: data collection design and implementation 1998-2003", *Small Business Economics*, Vol. 24 No. 3, pp. 205-231.

Roig-Tierno, N., Alcázar, J.N. and Ribeiro-Navarrete, S. (2015), "Use of infrastructures to support innovative entrepreneurship and business growth", *Journal of Business Research*, Vol. 68 No. 11, pp. 2290-2294.

Sanders, M. (2007), "Scientific Paradigms, entrepreneurial opportunities and cycles in economic growth", *Small Business Economics*, Vol. 28 No. 4, pp. 339-354.

Shaffer, S., Hasan, I. and Zhou, M. (2015), "New small firms and dimensions of economic performance", *Economic Development Quarterly*, Vol. 29 No. 1, pp. 65-78.

Shane, S.A. (2007), *Economic Development Through Entrepreneurship: Government*, University and Business Linkages, Edward Elgar Publishing, Cheltenham.

Shneor, R., Jenssen, J.I. and Vissak, T. (2016), "Introduction to the special issue: current challenges and future prospects of entrepreneurship in Nordic and Baltic Europe", *Baltic Journal of Management*, Vol. 11 No. 2, pp. 134-141.

Statistics Denmark (2016), "Statistics Denmark database", available at: www.dst.dk/en (accessed 22 April 2016).

Statistics Finland (2016), "Statistics Finland database", available at: www.stat.fi/index_en.html (accessed 22 April 2016).

Statistics Iceland (2016), "Statistics Denmark database", available at: www.statice.is/ (accessed 22 April 2016).

Statistics Norway (2016), "Statistics Norway database", available at: www.ssb.no/en (accessed 22 April 2016).

Statistics Sweden (2016), "Statistics Sweden database", available at: www.scb.se/en_ (accessed 22 April 2016).

Sternberg, R. and Wennekers, S. (2005), "Determinants and effects of new business creation using global entrepreneurship monitor data", *Small Business Economics*, Vol. 24 No. 3, pp. 193-203.

Svallfors, S. (2003), "Welfare regimes and welfare opinions: a comparison of eight western countries", *Social Indicators Research*, Vol. 64 No. 3, pp. 495-520.

Thurik, A.R. (1995), *Small Firms, Entrepreneurship and Economic Growth*, Tinbergen Institute, Amsterdam.

Van Stel, A., Storey, D.J. and Thurik, A.R. (2007), "The effect of business regulations on nascent and young business entrepreneurship", *Small Business Economics*, Vol. 28 Nos 2-3, pp. 171-186.

Van Praag, C.M. and Versloot, P.H. (2007), "What is the value of entrepreneurship? A review of recent research", Small Business Economics, Vol. 29 No. 4, pp. 351-382.

Verbeek, M. (2012), A Guide to Modern Econometrics, 4th ed., Wiley, Chichester, p. xv.

Vogel, J. (2003), "Towards a typology of European welfare production: summary and discussion", Social Indicators Research, Vol. 64 No. 3, pp. 547-572.

Wennekers, S., Van Wennekers, A., Thurik, R. and Reynolds, P. (2005), "Nascent entrepreneurship and the level of economic development", Small Business Economics, Vol. 24 No. 3, pp. 293-309.

Wooldridge, J.M. (2002), Econometric Analysis of Cross Section and Panel Data, The MIT Press, Cambridge.

World Bank (2016), "World bank database", available at: http://databank.worldbank.org/data/ (accessed 22 April 2016).

World Economic Forum (2016), "Global competitiveness report", available at: www3.weforum.org/docs/gcr/20152016/Global_Competitiveness_Report_2015-2016.pdf (accessed 22 April 2016).

4. Can Policy Makers Count with Positive Impact of Entrepreneurship on Economic Development of the Czech Regions?[5]

Abstract

Purpose - The purpose of the presented study was to empirically investigate the impact of the newly established entrepreneurial activity on the economic development of the Czech NUTS 3 regions during the period of years 2003-2015.

Design/methodology/approach – Econometric approach was used to validate the stated hypotheses assuming a positive relationship between the new entrepreneurial activity and regional economic growth and a negative relationship between the new entrepreneurial activity and unemployment rate. For the methods, regression models with fixed effects were estimated on the panel of the thirteen Czech regions, covering the period of years 2003-2015. The new entrepreneurial activity was classified into the two forms, rate of newly established self-employed per capita and rate of newly established business companies and partnerships per capita.

Findings - Different impacts of newly established business companies and self-employed were found on the real GDP per capita. Only the higher rates of newly established business companies and partnership were associated with higher levels of GDP per capita in the Czech regions and no impact was found for the rate of new self-employment. Nevertheless both forms of newly established entrepreneurial activity were associated with lower

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unemployment rates in the Czech regions, however the impact of newly established business companies was significantly higher. Obtained results have several policy implications, which are discussed in the paper.

Practical implications - Support of entrepreneurship in the Czech regions may improve the situation on the local labour markets and may deliver new job opportunities through the newly established enterprises. The Czech entrepreneurship policies focused on the growth of GDP and economic boom should be oriented more on the support of high growth enterprises (unicorns).

Originality/value - The empirical analysis was conducted based on the research gap in the studies related to the impact of the newly established entrepreneurial activity on the economic development of the Czech regions. Obtained results have several policy implications, which are discussed in the paper.

Keywords - Entrepreneurship, Regional Entrepreneurial Activity, Regional Development, Unemployment, GDP, Economic Growth, the Czech Republic, Regression Analysis

JEL codes - R11, O18, L26

4.1.   Introduction

Since Adam Smith´s times, economists, policy makers and researchers have started to study interregional differences in wealth of regions, countries or nations (Smith and Nicholson, 1887). Schumpeter (1934) was among those, who believed that entrepreneurial process belongs to the key factors affecting economic development. Entrepreneurs establish organizations, create new jobs, bring innovation and therefore boost economic growth (e. g. Thurik, 2009 or Wennekers and Thurik, 1999). However not all researchers were in consensus with this statement. In opposition to positive outcomes of entrepreneurship was for example Baumol (1996) who argued, that entrepreneurship may not have only positive impact, but also zero or negative effect. Ambiguity of the relationship has also been reported by latter scientists (e. g. Blanchflower, 2000; Fritsch and Mueller 2004; 2008 or Fritsch, 2008). Solution to this problem can be found only in empirical field of countries, regions or

cities. Koellinger and Thurik (2012) who encourage this approach, point out, that the relationship may vary over the time and across regions, are supported by other empirical scholars who further note, that the positive contributions of entrepreneurship may even vary across the types of entrepreneurial activity (e. g. Audretsch et al., 2015; Shaffer et al., 2015, Toma et al., 2014 or Floyd, 2014). Thanks to the technological progress and data availability we are able to quantify associations between entrepreneurship and economic development not only on the country level, but also on the regional level or even on the level of lower administrative units, such as cities, which have its own specifics. Lowering down the level of analysis has recently become trend among entrepreneurship scholars who conduct studies on entrepreneurship and regional development (e. g. Audretsch et al., 2015; Carree et al., 2015 or Matejovsky et al., 2014).

Empirical evidence in Central and Eastern European countries related to the impact of entrepreneurship on regional development is still relatively scarce, despite the fact that entrepreneurship is there perceived as a source of competitive advantage (Polok et al., 2016 or Welter and Smallbone, 2011) and one of the ways how to reduce unemployment (Dvouletý and Mareš, 2016a). The purpose of the presented article is to enrich academia not only in Central and Eastern European countries, but also to fill in the long term research gap by quantification of the relationship between entrepreneurship and regional economic development in the Czech Republic, which is a small open economy driven by innovation (World Economic Forum, 2016). Czech entrepreneurial knowledge is still in early stage of research, despite the fact that Czech entrepreneurship has a long history and tradition (Lukeš et al., 2013 or Dvouletý and Mareš, 2016a; 2016c). Lack of knowledge about the Czech entrepreneurship is even more embarrassing, when taking into account information that Joseph Alois Schumpeter himself was born in the Czech Republic (Holman, 2005). According to the national Global Entrepreneurship Monitor team (Lukeš et al., 2014), 5.3% of economically active population in the Czech Republic had in 2013 established enterprise and 7.3% established new business entity.

Once studying interregional differences and disparities in the Czech Republic, scholars stress the role of entrepreneurship (e. g. Dvouletý, 2017b; Šebestová et al., 2015; Baštová et al., 2011; Kutscherauer et al.; 2010 or Martinčík, 2008), however the more rigorous approach testing the impact of entrepreneurship on regional economic development is still missing. By positive economic development I mean in this paper increase in regional GDP per capita and decrease in regional unemployment rate. Entrepreneurship is considered in two forms – rate of new business companies and partnerships per capita and rate of newly self-employed per capita.

Following parts of the paper discuss the relationship between entrepreneurship and regional development in the light of previously published studies. After this section, findings of the local researchers in the Czech Republic, studying regional disparities are presented. Next part of the paper is focused on applied empirical approach and introduction of data, which are being used in econometric analysis performed in the following section. Finally, obtained results are discussed and formed into the conclusions in the last part of the article, which also includes policy recommendations.

4.2. Entrepreneurship and Regional Development

Researchers from the fields of psychology, sociology, management and economics have been united in entrepreneurship discipline by Shane and Venkataraman (2000) who on p. 219 frame entrepreneurship as a "process that involves the discovery, evaluation, and exploitation of opportunities to introduce new products, services, processes, ways of organizing, or markets." Through the economic process of exploitation of opportunities, entrepreneurship identifies inefficiencies in economies and mitigates those (Baum et al., 2014). Rationality behind this process can be according to Burns (2010) summarized by the three reasons; generation of variety, diversity and originality, spread of (new) knowledge across individuals and organizations, and increase in competition caused by overall increase in entrepreneurial activity. Where the innovativeness is highlighted by researchers most frequently (e. g. Wennekers and Thurik, 1999; Thurik, 2009; Lukeš, 2013 or Toma et al., 2014). Higher entrepreneurial activity in the region may lead to increase in productivity,

higher employment, growth of individual incomes and result in increased economic growth and higher level of GDP per capita (e. g. Van Stel and Storey, 2004; Shane, 2007; Craig et al., 2007 or Van Praag and Versloot, 2007). These positive effects of entrepreneurship may nevertheless differ across the geographical location, over the time and across the stage of economic development of the particular area (e. g. Koellinger and Thurik, 2012; Audretsch et al., 2015 or Shaffer et al., 2015).

Not every newly established enterprise acts as a unicorn firm, which usually creates new jobs and experience rocket economic growth. Commonly used rate of self-employment in formerly published empirical studies (e. g. Carree et al. 2015 or Van Praag and Van Stel, 2013) may often include individuals, who perceive self-employment as an alternative option to wage employment. Increase in self-employment hence does not always have to lead to economic boost and creation of new jobs (Shane, 2009). However self-employment can result in reduction of unemployment, since some unemployed individuals perceive entrepreneurship as a way how to earn income till the moment, when the conditions on labour market improve (e. g. Dvouletý, 2017b; Dvouletý and Lukeš, 2016 or Dvouletý and Mareš, 2016b). Boost in regional economic growth would be expected more from dynamic and innovative SMEs, business companies and partnerships, and therefore one needs to distinguish among several forms of entrepreneurship and to empirically test their impact on regional economic development (e. g. Audretsch et al., 2015; Brekke, 2015 or Shaffer et al., 2015).

In empirical analysis, researchers challenge an important issue arising from the need to operationalize entrepreneurial activity. The best way how to measure entrepreneurial activity is to use data from population surveys, delivering information about the share of active entrepreneurs and newly established entrepreneurs in population (Dvouletý and Mareš, 2016a). Unfortunately, these surveys are not that extensive to cover detailed time series on country levels, nor on regional levels. Therefore researchers often substitute entrepreneurship by registered business activity (e. g. Llopis et al., 2015; Koellinger and Thurik, 2012 or Carree and Thurik, 2008) and argue, that this quantification does not

substantially bias the results (Dvouletý, 2017a; Dvouletý, 2017b; Freytag and Thurik, 2007). Fritsch and Wyrwich (2016) among others show, that it is important to calculate rates of registered enterprises/self-employed, since regions differ in total amount of (newly) registered businesses, size and population. Some researchers work with newly registered entities (e. g. Audretsch et al., 2015 or Shaffer et al., 2015) and test their impact on outcome variables in static form and others study dynamic relationships and work with growth population of registered business and changes in outcome variables (e. g. Matejovsky et al., 2014 or Koellinger and Thurik, 2012). Design of analysis very often depends on the data availability, since growth forms demand longer time series.

As for outcome variables, scholars use static and dynamic forms of GDP per capita, national income per capita, unemployment rate or employment rate and their combinations. Authors commonly follow econometric approach and estimate static and dynamic multivariate regression models. List of integrated control variables very depends on the data availability, but commonly used controls cover population growth, population density, expenditures on research and development, percentage of population with tertiary (college) graduation or economically active population (e. g. Matejovsky et al., 2014; Llopis et al., 2015 or Carree et al., 2015).

4.3. *Czech Regional Disparities and Tested Hypotheses*

Variables, methods and results obtained in other parts of the world may be inspiring for own research in the Czech Republic, however one also needs to take into consideration already developed knowledge about regional disparities and entrepreneurship. Therefore a purpose of this section is to present empirical findings of scholars studying national conditions in the Czech Republic. When we talk about the regional disparities, one can classify the Czech regions according to the most frequently mentioned European classification units. Country consists of the fourteen larger regions (NUTS 3) and out of seventy seven local administrative units (LAU 1) – districts (Czech Statistical Office, 2016). Both ways of measurement are considered as adequate for studying regional disparities in the Czech Republic, however more data are available on the NUTS 3 level (Baštová et al., 2011).

There is a common agreement among the scholars that divergences among regions exists, and further increased in the 21st century (Mirošník et al., 2016 or Blažek and Csank, 2007). Continuing differentiation may result in accumulation of social problems and socioeconomic instability (Baštová et al., 2011). The first step to investigate regional disparities was to set up objective measures and monitor disparities over the time. Factors having impact on disparities may be classified into social, historical, geographical (territorial) and economic variables (Kutscherauer et al., 2010). Key identified variables are according to authors in the Czech regional economic development: GDP per capita, growth of GDP, average gross wage, income, unemployment rate, entrepreneurial activity, population density, demographical trend, traffic infrastructure, educational, age and labour structure of inhabitants, presence of universities and research centres (e. g. Zimmermannová et al., 2016; Šebestová et al., 2015; Baštová et al., 2011, Kutscherauer et al., 2010; Damborský and Wokoun, 2010; Martinčík, 2008; Paul Dana, 2000). Discussed needs to be also impact of cohesion policies (Blažková, 2016; Edoho, 2016; Dvouletý and Lukeš, 2016 or Kolařík et al., 2014) and the role of foreign direct investments (Damborský and Wokoun, 2010).

Presented studies are in consensus that variables should be expressed per capita or per thousand of inhabitants and scholars stress the importance of recalculating variables denominated in financial units into real values, adjusting them from inflation. The impact of entrepreneurship is discussed and highlighted by the previous scholars, however to my best knowledge, no study has tried to empirically test its impact on regional economic performance of the Czech regions, measured by employment or GDP per capita. Therefore I work with variables presented in the next section and test their influence of entrepreneurship on the Czech regional economic development. Formally I state four following hypotheses:

H_1: There was a positive relationship between newly established self-employed and GDP per capita in the Czech regions during analysed period.

H₂: There was a positive relationship between newly established business companies, partnerships and GDP per capita in the Czech regions during analysed period.

H₃: There was a negative relationship between newly established self-employed and unemployment rate in the Czech regions during analysed period.

H₄: There was a negative relationship between newly established business companies, partnerships and unemployment rate in the Czech regions during analysed period.

4.4. Data and Variables

To conduct empirical analysis, variables had to be collected from different sources and formed into a panel of fourteen Czech NUTS 3 regions. Collected data cover the period of years 2000-2015, however some of the variables were not available for all years. Data were collected on annual basis, since more frequent data for the key variables were not available. Outcome (dependent) variables representing economic performance of the regions are GDP per capita and unemployment rate. Both variables were collected from the Czech Statistical Office (2016), with note that GDP per capita had to be converted into real GDP per capita with usage of GDP deflator, collected from Eurostat database (2016). GDP per capita (*REAL_GDP_PER_CAPITA*) is denominated in the real Czech crowns and unemployment rate (*UNEMPLOYMENT_RATE*) is reported in percentages.

Figure 1 demonstrates the development of the real GDP per capita across the Czech regions over the analysed period of years. The Capital Praha obviously steps ahead of the regions with the highest level of real GDP per capita. The second richest region in the Czech Republic is region surrounding the Capital – Stredocesky region. The poorest regions in terms of this indicator were during analysed period regions Karlovarsky and Olomoucky, which report lower real GDP per capita by fifty percentage points, compared to the Capital Praha.

Figure 1: Development of real GDP per capita across the Czech regions over the period of years 2000-2015
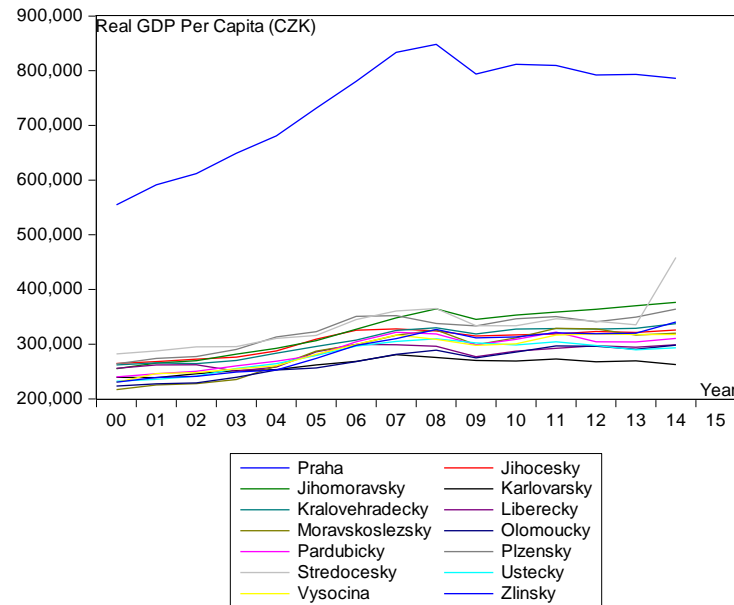
Source: Data from the Czech Statistical Office (2016), own elaboration in EViews

Very similar pattern can be observed on Figure 2, representing development of unemployment rate. Capital Praha reported during observed period lowest unemployment rate (on average 3%), followed by Stredocesky region (on average 5%). The most endangered regions by unemployment were during analysed period regions Ustecky (11%), Moravskoslezsky (11%) and Karlovarsky (9%). Both indicators confirm the statements about persistence of regional disparities across the Czech regions.

Figure 2: Development of unemployment rate across the Czech regions over the period of years 2000-2015

Summary statistics for all variables are presented in Table 1. Crucial explanatory variables, measuring level of new entrepreneurial activity, are rate of newly established business companies and partnerships per capita (*NEW_BUSS_COMP_CAPITA*) and rate of newly established self-employed per capita (*NEW_SELFEMPLOYED_CAPITA*). Both rates were calculated based on the regional time series obtained from the Czech Statistical Office (2016). Unfortunately, data for new registrations are reported only from year 2003. As expected, most likely was new enterprise set up in Capital Praha, contrary to the region Moravskoslezsky, which reported the lowest rate of new registrations. On average, the rate of new business companies and partnerships was higher, compared to the rate of newly established self-employed.

Other control (explanatory) variables cover regional innovation activity operationalized as a number of patent applications per thousands of citizens (*PATENT_APPLICATIONS_THS_POP*) obtained from the Industrial Property Office (2016), population density obtained from the Czech Statistical Office as well as the

following variables (*POPULATION_DENSITY*), percentage share of economically active population aged 15-64 years (*SHARE_ECON_ACTIVE_POP*) and percentage share of tertiary educated population (*SHARE_TERTIARY_EDUCATED_POP*).

It is not difficult to discuss, why the region Praha reports the best economic performance out of all Czech regions, however differences in newly established entrepreneurial activity may look suspiciously, especially when taking into account information that the rates of new registrations were calculated per capita. Intuitive explanation is offered by Baštová et al. (2011) who point out that entrepreneurs register their activities more frequently in the Capital, due to the lower probability of financial control. Nevertheless, Praha is obviously an outlier observation and estimation of econometric models with region could bias the results. To maintain this risk, I exclude the region from the empirical analysis.

Table 1: Summary Statistics

Variable	Mean	Median	Max.	Min.	S.D.	Obs.
REAL_GDP_PER_CAPITA	295206.6	297264.5	458360.7	216770.7	37469.	195
UNEMPLOYMENT_RATE	7.25	6.79	15.98	2.60	2.62	208
PATENT_APPLICATIONS_THS_POP	0.05	0.05	0.14	0.005	0.03	208
POPULATION_DENSITY	122.68	116.30	230.47	62.11	42.98	208
SHARE_ECON_ACTIVE_POP	69.69	70.17	71.97	65.27	1.60	207
SHARE_TERTIARY_EDUCATED_POP	8.74	8.30	18.50	4.11	2.80	208
NEW_SELFEMPLOYED_CAPITA	0.005	0.005	0.007	0.004	0.0008	169
NEW_BUSS_COMP_CAPITA	0.009	0.009	0.017	0.002	0.0035	169

Source: EViews, elaboration

4.5. Econometric Approach and Results

Following the methodology of previous scholars, I use econometric techniques to evaluate the impact of entrepreneurial activity on economic development of the Czech regions. Variables were structured in a panel of thirteen Czech regions (without region Praha) and cover the period of years 2003-2015. Variables were further inspected for stationarity to

ensure that non-stationary variables would not bias the results. As common in previous empirical studies, the variable representing the real GDP per capita, was transformed into the form of natural logarithm. All variables passed unit root test and were found to be stationary (Verbeek, 2012).

Multivariate regression models were then estimated with Pooled OLS, Fixed Effects and Random Effects techniques. Hausman statistics and Likelihood Ratio tests were used to evaluate the most suitable estimation technique. Results of the tests were in favour of Fixed Effects approach (Baltagi, 2016). Econometric models presented in Table 2 were therefore estimated with Fixed Effects controlling for unobserved heterogeneity across the Czech regions. Violation of econometric assumptions resulting in autocorrelation and heteroscedasticity was controlled by estimation with White diagonal standard errors and covariance. Collinearity among explanatory variables was found to be sufficient, based on the results of Variance Inflation Factors test (Verbeek, 2012). Presented models were found to be statistically significant and in terms of R-Squared provide a good explanatory power of variance of the dependent variables. Estimated coefficients and their statistical significance are further used for evaluation of stated hypotheses.

The first two estimated models (Model 1 and Model 2) were quantified to investigate the impact of both types of entrepreneurial activity on the regional real GDP per capita. Obtained results were inspected in the light of previously published studies and described theories. Variable representing unemployment rate was found to be statistically significant and supported on the data for the Czech regions negative relationship between unemployment and GDP per capita, described by the theory of Okun Law, previously obtained for the Czech Republic in the study written by Zanin (2014).

Positive relationship with the GDP per capita was found for the variables representing share of economically active population and share of tertiary educated population in the Czech regions. One can therefore state that the regions with more educated and higher level of active labour force were associated with higher levels of GDP per capita as already established in previous research findings (e. g. Glaeser et al., 2004 or Schäffler et

al., 2016). Remaining control variables representing population density and patent activity were unfortunately not found to be statistically significant and their influence needs to be tested in upcoming studies.

The most interesting finding was that the positive and statistically significant impact of entrepreneurial activity on the GDP per capita was found only for the rate of new business companies and partnerships. No statistically significant relationship was observed for the rate of newly established self-employed. This result supports the statements of Shane (2007) or Audretsch et al. (2015) who note that it is important to distinguish among different forms of entrepreneurship. Self-employment is perceived as an alternative way of employment and does not necessary have to create new jobs and lead to increase in GDP per capita as it has been now illustrated on the Czech regional data. Therefore only hypothesis H_2 can be supported and not hypothesis H_1.

The second pair of econometric models (Model 3 and Model 4) was constructed to analyse the impact of entrepreneurial activity on regional unemployment rate. From the control variables, besides the GDP per capita, population density and share of economically active population were used. Population density suggested positive association with unemployment rate (obtained for example by Van Stel and Suddle, 2008) and the proportion of economically active population (work force), negative impact.

The most important finding was the negative and statistically significant relationship for the both forms of entrepreneurial activity and unemployment rate. Based on obtained findings, regions with higher levels of newly established self-employed per capita and new business companies per capita were associated with lower levels of unemployment rates as reported by previous researchers (e. g. Carree et al., 2015; Dvouletý and Mareš, 2016b or Thurik et al., 2008). Even more interesting observation was associated with the difference in coefficients for both forms of entrepreneurship. Significantly higher coefficient was estimated for the rate of newly found business companies and partnerships (in Model 4) compared to the rate of newly established self-employed (in Model 3), supporting previously mentioned argument of different impact of various forms of entrepreneurship. Newly

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established companies and partnerships more likely employ besides their owners another employees, create new job opportunities and hence reduce unemployment rate in larger proportions, compared to newly found self-employed, staying often as solo-entrepreneurs. Based on the results obtained in Models 3 and 4, both hypothesis H_3 and H_4 are supported.

Table 2: Estimated Econometric Models

Variable / Model	Model 1	Model 2	Model 3	Model 4
Table 2 ESTIMATED ECONOMETRIC MODELS				
Dependent variable	LOG_REAL_GDP_CAPITA		UNEMPLOYMENT_RATE	
POPULATION_DENSITY	**-0.000221**	**0.000535**	**0.152586****	**0.124394****
	(0.004085)	(0.003812)	(0.064596)	(0.059695)
UNEMPLOYMENT_RATE	**-0.013948*****	**-0.010019*****		
	(0.003639)	(0.003275)		
PATENT_APPLICATIONS_THS_POP	**0.039936**	**-0.032685**		
	(0.322434)	(0.296783)		
SHARE_ECON_ACTIVE_POP	**0.032308*****	**0.018270*****	**-0.231350***	**-0.195378**
	(0.007872)	(0.007242)	(0.123432)	(0.138447)
SHARE_TERTIARY_EDUCATED_POP	**0.044806*****	**0.033625*****		
	(0.006248)	(0.005967)		
NEW_SELFEMPLOYED_CAPITA	**-1.983243**		**-269.8032***	
	(5.926284)		(142.8513)	
NEW_BUSS_COMP_CAPITA		**86.32601*****		**-1033.572***
		(21.22959)		(577.6875)
LOG_REAL_GDP_CAPITA			**-10.71293*****	**-8.657479*****
			(1.901101)	(2.374435)
CONSTANT	**10.10189*****	**10.95430*****	**141.3766*****	**116.0798*****
	(0.541040)	(0.528654)	(29.12266)	(37.99966)
R-Squared	0.801027	0.828087	0.702872	0.702761
Adj. R-squared	0.774885	0.805500	0.668670	0.668546
F-statistic	30.64091	36.66205	20.55072	20.53981
Observations	156	156	156	156
Note: Standard Errors are in parentheses *** stat. significance on 1 %, ** stat. significance on 5 %, * stat. significance on 10 %.				

Source: EViews, elaboration

4.6. Conclusion

The relationship between entrepreneurship and regional development has become a traditional controversy investigated by entrepreneurial scholars. Positive effects of entrepreneurship on the regional development may according to previous researchers change over the time and across the regions and therefore needs to be investigated continuously (e. g. Koellinger and Thurik, 2012). This study aimed to serve as a contribution to entrepreneurial knowledge in Central and Eastern Europe (CEE), with the focus on the impact of newly established entrepreneurial activity on economic development of the Czech NUTS 3 regions. To the best knowledge of author, such an analysis has never been conducted so far. Another motivation for this research was to enrich the current entrepreneurial research investigating the role of regional entrepreneurial activity in the context of lower administrative units, such as regions or cities (e. g. Glaeser et al., 2010). From this perspective paper delivers an interesting value even for international audience.

Based on the previous empirical findings, entrepreneurship has been divided into the two most frequently appearing forms – rate of newly established business companies and partnership and rate of newly established self-employed. Economic development of the thirteen Czech NUTS 3 regions was operationalized by the real GDP per capita and unemployment rate. Four hypotheses investigating the relationship between the both forms of new entrepreneurial activity and the regional economic development of the Czech regions were stated and econometrically tested. The empirical regression analysis was used for the analysis of the relationship over the period of years 2003-2015.

Econometric approach employing the multivariate regression models revealed that both forms of newly established entrepreneurial activity were associated with lower unemployment rates in the Czech NUTS 3 regions, which can be perceived as an interesting delivery and supportive evidence for the Czech entrepreneurship policy makers. Support of entrepreneurship in the Czech regions may therefore improve situation on the local labour markets and deliver new job opportunities through the newly established enterprises (Dvouletý, 2017b). However, according to the obtained results, the impact of newly

established business companies was significantly higher, compared to the impact of the newly established self-employed.

Different outcomes of newly established business companies and self-employed were obtained also in the regression models investigating the effect of new entrepreneurial activity on the real GDP per capita. Only the higher rates of newly established business companies and partnership were associated with higher levels of GDP per capita in the Czech regions and no impact was found for the rate of newly established self-employed. The Czech entrepreneurship policies focused on the growth of GDP and economic boom should hence be oriented more on the support of high growth enterprises (unicorns) delivering new job opportunities as already pointed out by Shane (2009). However if the main aim of the Czech regional policy makers is to improve the labour market conditions and to decrease unemployment rates, then the support of both forms of entrepreneurial activity may be an alternative option, fulfilling this task (Dvouletý and Lukeš, 2016). Tools to achieve higher level of new entrepreneurial activity should combine organization of entrepreneurial trainings, workshops and the good system of supportive infrastructure, linking services of technology centers, business incubators and science parks. Much more effort also needs to be put into reduction of bureaucracy and administrative barriers of entry. Regional entrepreneurial ecosystem coordinating work of public sector authorities, research institutions and entrepreneurial stakeholders needs to be improved. Simpler and efficient entrepreneurial ecosystem may be a source of competitive advantage and result in higher economic growth and lower unemployment (Dvouletý and Mareš, 2016a; 2016b).

Presented results definitely support arguments of the previous entrepreneurial scholars highlighting the differences across the forms of entrepreneurial activity and their impacts (e. g. Audretsch et al., 2015 or Shaffer et al., 2015). Future researchers should address specificities of self-employment and business companies and partnerships, when conducting empirical analysis and test, whether their impact on economic performance and employment differs. Upcoming research should also address entrepreneurial activity in the Central and Eastern European region, where entrepreneurial knowledge is still relatively

scarce. Another challenge for future research is to conduct dynamic analysis of the relationships, which could be estimated on the longer time series, which are currently not available. With more detailed data, it would be interesting to broaden the horizon of analysis not only on the level of regions, but also on the level of districts or cities.

4.7. *References*

Audretsch, D. B., Belitski, M., & Desai, S. (2015). Entrepreneurship and economic development in cities. *The Annals of Regional Science*, *55*(1), 33-60.

Baltagi, B. (2016). *Econometric analysis of panel data*. John Wiley & Sons.

Baštová, M., Hubáčková, V., & Frantál, B. (2011). Interregional differences in the Czech Republic, 2000-2008. *Moravian Geographical Reports*, 19(1), 2-16.

Baumol, W. J. (1996). Entrepreneurship: Productive, unproductive, and destructive. *Journal of Business Venturing*, *11*(1), 3-22.

Baum, J. R., Frese, M., & Baron, R. A. (2014). *The psychology of entrepreneurship*. Psychology Press.

Blanchflower, D. G. (2000). Self-employment in OECD countries. *Labour economics*, *7*(5), 471-505.

Blažek, J., & Csank, P. (2007). Nová fáze regionálního rozvoje v ČR? *Sociologický časopis/Czech Sociological Review*, *43*(05), 945-965.

Blažková, I. (2016). The Impact of the Public Support for R & D on the Economic Performance of SMEs. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *64*(1), 213-222.

Brekke, T. (2015). Entrepreneurship and path dependency in regional development. *Entrepreneurship & Regional Development*, *27*(3-4), 202-218.

Burns, P. (2010). *Entrepreneurship and Small Business: Start-up. Growth and Maturity*. Palgrave Macmillan.

Carree, M. A., & Thurik, A. R. (2008). The lag structure of the impact of business ownership on economic performance in OECD countries. *Small Business Economics*, *30*(1), 101-110.

Carree, M., Congregado, E., Golpe, A., & van Stel, A. (2015). Self-employment and job generation in metropolitan areas, 1969–2009.*Entrepreneurship & Regional Development*, *27*(3-4), 181-201.

Craig, B. R., Jackson, W. E., & Thomson, J. B. (2007). Small Firm Finance, Credit Rationing, and the Impact of SBA-Guaranteed Lending on Local Economic Growth. *Journal of small business management*, *45*(1), 116-132.

Czech Statistical Office (2016). Regional time series. 402Q. Retrieved September 20, 2016, from https://www.czso.cz/csu/czso/trh-prace-v-cr-casove-rady-1993-az-2014

Mirošník, K., Čadil, J., & Čermáková, K. (2016). Small business and cohesion policy-statistical evidence from the Czech Republic. *International Journal of Entrepreneurship and Small Business*, *29*(3), 398-415.

Damborský, M., & Wokoun, R. (2010). Location Factors of Small and Medium Entrepreneurship under the economic conditions of the Czech Republic. *E +M Ekonomie a Management*, *13*(2), 32-43.

Dvouletý, O. (2017a). Determinants of Nordic Entrepreneurship. *Journal of Small Business and Enterprise Development*, 24(1) (in print).

Dvouletý, O. (2017b). Relationship between Unemployment and Entrepreneurship Dynamics in the Czech Regions: A Panel VAR. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* (in print).

Dvouletý, O., & Lukeš, M. (2016). Review of Empirical Studies on Self-Employment out of Unemployment: Do Self-Employment Policies Make a Positive Impact? *International Review of Entrepreneurship*, 14(3), 361-376.

Dvouletý, O., & Mareš, J. (2016a). Determinants of regional entrepreneurial activity in the Czech Republic. *Economic Studies & Analyses/Acta VSFS*, 10(1), 31-46.

Dvouletý, O., & Mareš, J. (2016b). Relationship between unemployment and entrepreneurial activity: Evidence found among Visegrad countries. *4th International Conference: Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS),* 146-156.

Dvouletý, O., & Mareš, J. (2016c). Entrepreneurial activity in the Czech regions: Are business companies and self-employed individuals affected by the same factors? *10th International Days of Statistics and Economics,* 418-428.

Edoho, F. M. (2016). Entrepreneurship paradigm in the new millennium: A critique of public policy on entrepreneurship. *Journal of Entrepreneurship in Emerging Economies*, *8*(2), 279-294.

Eurostat (2016). Price index (implicit deflator), 2010=100, national currency. Retrieved September 20, 2016, from http://ec.europa.eu/eurostat/data/database

Floyd, D. (2014). *Handbook of Emerging Economies*, *Journal of Entrepreneurship in Emerging Economies*, 6(3), 312-313.

Freytag, A., & Thurik, R. (2007). Entrepreneurship and its determinants in a cross-country setting. *Journal of evolutionary Economics*, *17*(2), 117-131.

Fritsch M. and Mueller P. (2004) Effects of new business formation on regional development over time, *Regional Studies* 38, 961-975.

Fritsch, M. (2008). How does new business formation affect regional development? Introduction to the special issue. *Small Business Economics*, 30(1), 1-14.

Fritsch, M., & Mueller, P. (2008). The effect of new business formation on regional development over time: The case of Germany. *Small Business Economics*, 30(1), 15-29.

Fritsch, M., & Wyrwich, M. (2016). The persistence of regional entrepreneurship. *Geographies of Entrepreneurship*, 48.

Glaeser, E. L., Saiz, A., Burtless, G., & Strange, W. C. (2004). The rise of the skilled city. *Brookings-Wharton papers on urban affairs*, 47-105.

Glaeser, E. L., Rosenthal, S. S., & Strange, W. C. (2010). Urban economics and entrepreneurship. *Journal of Urban Economics*, *67*(1), 1-14.

Holman, R. (2005). *Dějiny ekonomického myšlení*. Nakladatelství CH Beck.

Industrial Property Office (2016). Number of patents. Retrieved September 20, 2016, from https://www.upv.cz/en.html

Koellinger, P. D., & Roy Thurik, A. (2012). Entrepreneurship and the business cycle. *Review of Economics and Statistics*, *94*(4), 1143-1156.

Kolařík, P., Šumpela, V., & Tomešová, J. (2014). European Union's Cohesion Policy-Diversity of the Multi-Level Governance Concept, the Case Study of Three European States. *European Spatial Research and Policy*, *21*(2), 193.

Kutscherauer, A., Fachinelli, H., Hučka, M., Skokan, K., Sucháček, J., Tománek, P., & Tuleja, P. (2010). *Regional disparities in regional development of the Czech Republic–their occurrence, identification and elimination*. Ostrava: VŠB-Technical University of Ostrava.

Llopis, J. A. S., Millán, J. M., Baptista, R., Burke, A., Parker, S. C., & Thurik, R. (2015). Good times, bad times: entrepreneurship and the business cycle. *International Entrepreneurship and Management Journal*, *11*(2), 243-251.

Lukeš, M. (2013). Entrepreneurs as Innovators: A Multi-Country Study on Entrepreneurs' Innovative Behaviour. *Prague Economic Papers*, *22*(1), 72-84.

Lukeš, M., Zouhar, J., Jakl, M., & Očko, P. (2013). Faktory ovlivňující vstup do podnikání: začínající podnikatelé v České republice. *Politická ekonomie*, *61*(2), 229-247.

Lukeš, M., Jakl, M., & Zouhar, J. (2014). *Global Entrepreneurship Monitor 2013 for the Czech Republic. Podnikatelská aktivita v České republice.* Retrieved September 20, 2016, from http://www.mpo.cz/dokument149362.html.

Matejovsky, L., Mohapatra, S., & Steiner, B. (2014). The dynamic effects of entrepreneurship on regional economic growth: Evidence from Canada. *Growth and Change*, *45*(4), 611-639.

Martinčík, D. (2008). Ekonomicko-sociální úroveň krajů: komplexní srovnávací analýza. *E+M Ekonomie a Management,* 1, 14-25.

Paul Dana, L. (2000). The hare and the tortoise of former Czechoslovakia: reform and enterprise in the Czech and Slovak Republics. *European Business Review*, *12*(6), 337-344.

Polok, D., Michalski, P., Szewczyk, D., Keil, D., Wieczore, S., Kaciakova, P., Incze, Z., Rycerz, J., Nisztuk, T., Dvouletý, O., Krzemiński, P. (2016). *Future of the Visegrad Group*. Retrieved September 20, 2016, from http://paga.org.pl/projekty/raport-future-of-the-visegrad-group/future-of-the-visegrad-group/report?lang=en

Shaffer, S., Hasan, I., & Zhou, M. (2015). New small firms and dimensions of economic performance. *Economic Development Quarterly*, 29(1), 65-78.

Schäffler, J., Hecht, V., & Moritz, M. (2016). Regional determinants of German FDI in the Czech Republic: new evidence on the role of border regions. *Regional Studies*, 1-13.

Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of management review*, *25*(1), 217-226.

Shane, S. A. (Ed.). (2007). *Economic development through entrepreneurship: Government, university and business linkages*. Edward Elgar Publishing

Shane, S. (2009). Why encouraging more people to become entrepreneurs is bad public policy. *Small business economics*, *33*(2), 141-149.

Schumpeter, J. A. (1934). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle* (Vol. 55). Transaction publishers.

Smith, A., & Nicholson, J. S. (1887). *An Inquiry Into the Nature and Causes of the Wealth of Nations...* T. Nelson and Sons.

Šebestová, J., Klepek, M., Čemerková, Š., & Adámek, P. (2015). Regional Entrepreneurship Culture and the Business Lifecycle: Patterns from the Moravian-Silesian Region. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *63*(6), 2137-2144.

Thurik, A. R., Carree, M. A., Van Stel, A., & Audretsch, D. B. (2008). Does self-employment reduce unemployment? *Journal of Business Venturing*, *23*(6), 673-686.

Thurik, A. R. (2009). Entreprenomics: entrepreneurship, economic growth and policy. *Entrepreneurship, growth and public policy*, 219-249.

Toma, S. G., Grigore, A. M., & Marinescu, P. (2014). Economic development and entrepreneurship. *Procedia Economics and Finance*, *8*, 436-443.

Van Praag, C. M., & Versloot, P. H. (2007). What is the value of entrepreneurship? A review of recent research. *Small business economics*, *29*(4), 351-382.

Van Praag, M., & van Stel, A. (2013). The more business owners, the merrier? The role of tertiary education. *Small Business Economics*, *41*(2), 335-357.

Van Stel, A., & Storey, D. (2004). The link between firm births and job creation: Is there a Upas tree effect? *Regional Studies*, *38*(8), 893-909.

Van Stel, A., & Suddle, K. (2008). The impact of new firm formation on regional development in the Netherlands. *Small Business Economics*, 30(1), 31-47.

Verbeek, M. (2012). *A guide to modern econometrics*. John Wiley & Sons.

Welter, F., & Smallbone, D. (2011). *Handbook of research on entrepreneurship policies in central and eastern Europe*. Edward Elgar Publishing.

Wennekers, S., & Thurik, R. (1999). Linking entrepreneurship and economic growth. *Small business economics*, *13*(1), 27-56.

World Economic Forum (2016). Global Competitiveness Report 2015-2016. Retrieved September 20, 2016, from http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf

Zanin, L. (2014). On Okun's law in OECD countries: an analysis by age cohorts. *Economics Letters*, *125*(2), 243-248.

Zimmermannová, J., Skalickova, J., & Siroky, J. (2016). What can tax revenues tell us about the economic activity of regions? *Economics & Sociology*, *9*(1), 114.

5. Relationship between Unemployment and Entrepreneurship Dynamics in the Czech Regions: A Panel VAR Approach[6]

Abstract

Investigation of the relationship between unemployment and entrepreneurship still does not provide conclusive results and scholars argue that the relationship needs to be further investigated. In the Czech context, the knowledge about entrepreneurship is still underdeveloped. The purpose of this paper is to investigate the dynamics of the relationship between unemployment and entrepreneurship, applying the methodology used by Koellinger and Thurik (2012) with usage of the quarterly data for the Czech NUTS 3 regions for the period of years 2003-2014. Collected sample of 672 region-quarter observations was obtained from the Czech Statistical Office. Estimated panel vector autoregressive (VAR) models with impulse response function supported hypothesis assuming a positive relationship between unemployment and entrepreneurship, operationalized as annual growth in registered business activity. Obtained results also showed that after the shock in unemployment, dynamics of entrepreneurship increased above its initial level after two years, concluding that it may take up to two years before positive effects on entrepreneurship reveal. This finding provides value for entrepreneurship policy makers. Based on the obtained results author suggests to support entrepreneurial activity, especially during the times of higher unemployment rate.

5.1. Introduction

Scientific debate regarding the relationship between unemployment and entrepreneurship is, despite the recent increase in the amount of published studies (Dvouletý, 2017; Dvouletý and Mareš, 2016a, Cueto et al., 2015, Klapper et al., 2015 or Fritsch et al., 2015), still not fully conclusive and scholars point out that this relationship varies over the time and across countries (Baptista and Thurik, 2007). Results of this research have clear implications for entrepreneurship policy makers, providing them tool for the decisions about the future adjustment of entrepreneurship policies during the times of higher unemployment rate.

In the Czech context, scientific knowledge about the entrepreneurship is still relatively scarce, despite the fact that entrepreneurship plays an important role in economic development of the Czech Republic, but also of the whole Central and Eastern European region (Holienka et al., 2016; Polok et al., 2016; Šebestová et al., 2015 or Welter and Smallbone, 2011). According to the Global Entrepreneurship Monitor, on average 5.3% of adults were involved in established business activity in the Czech Republic in 2013 (Lukeš et al., 2014). Several articles investigated entrepreneurship in the Czech Republic from the micro level perspective (see, e. g. Lukeš and Zouhar, 2016, Belás et al., 2015 or Strýčková, 2015), however even fewer of them aimed to study the whole population of enterprises and its development over time. One recent contribution related to the determinants of the Czech entrepreneurship has been published by Hájek et al. (2015) who were unable to find any statistically significant relationship between entrepreneurial activity and unemployment rate. Contrary to Dvouletý and Mareš (2016b) who found positive, statistically significant relationship between entrepreneurship and unemployment rate. Both studies work with annual data and analyse entrepreneurship statically.

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The purpose of this article is to investigate dynamics of the relationship between entrepreneurship and unemployment in the Czech NUTS 3 regions using quarterly data for population of active enterprises and unemployment rate, covering the period of years 2003-2014. Empirical part of the study works with the sample of 672 region-quarter observations and monitors the fourteen Czech NUTS 3 regions for the period of 48 quarters. Empirical approach follows methodologically the study of Koellinger and Thurik (2012) who quote the words of Hoover et al. (2008) "let the data speak freely" and who estimated vector autoregressions with impulse response functions to analyse the dynamics of entrepreneurship and unemployment.

Next part is dedicated to the literature review, studying the previously published studies related to the relationship between entrepreneurship and unemployment. This section also describes the applied empirical approach and presents the tested hypothesis. The following part provides reader information about collected data and presents descriptive statistics of the key variables. After the dataset is introduced, reader is guided through the estimation of vector autoregressive (VAR) model. In the same section, obtained results from the impulse response function are discussed. Finally, recommendations for future research and policy implications can be found in conclusion.

5.2.   Unemployment and Entrepreneurship

Ambiguity of the relationship between unemployment and entrepreneurship is commonly explained by the researchers in the following way, discussing two effects acting against each other. Decline in the economic growth and fall of the economy into the recession is usually associated with the higher level of unemployment rate and decrease in salaries due to the overall drop of aggregated demand, which finally results in the decrease of entrepreneurial activity (Dvouletý, 2017; Grilo and Thurik, 2004, Carree and Thurik, 2010). At the same time, decrease in salaries and wages lowers the opportunity costs for business start-up, especially for unemployed individuals, whose opportunity costs are benefits (unemployment spells) collected during the stay in unemployment. That makes from unemployed people an important source of potential entrepreneurs, since unemployment benefits are lower than the

expected payoff from engagement in entrepreneurship (Parker, 2009, Congregado et al., 2009). Since unemployed do not have better alternative opportunities, this kind of entrepreneurship is associated with the term necessity entrepreneurship, providing unemployed an opportunity to earn money for living, till better alternative opportunities reveal on the labour market (Carree and Thurik, 2010). Hence the total amount of newly created enterprises may exceed the number of businesses closed due to recession and result in the higher level of entrepreneurial activity. However once the economic performance turns into an economic growth, necessity entrepreneurs may withdraw from entrepreneurial activity because of the better alternative opportunities on the labour market and overall entrepreneurial activity may even decrease (Llopis et al., 2015, Fotopoulos, 2014, Koellinger and Thurik, 2012).

Baptista and Thurik (2007) point out that this relationship may vary over time and across countries and needs to be empirically investigated econometrically. Potential outcomes should be monitored with up to the two year lags. Positive, pro-cyclical relationship between unemployment and entrepreneurship has been obtained recently by Fritsch et al. (2015). Nevertheless, Cueto et al. (2015) note that the positive effect on entrepreneurial activity occurs only when unemployment rate increases substantially. Koellinger and Thurik (2012) studied the dynamics of entrepreneurship and business cycle using population of registered businesses, GDP per capita and unemployment rate for 22 OECD countries over the period of years 1972-2012. To analyse the relationship, authors estimated vector autoregressive (VAR) models and constructed impulse response functions to illustrate the impact of increase in entrepreneurial activity on unemployment rate over the time. Their results confirmed that entrepreneurship leads to decline in unemployment rate and increase in economic growth.

One of the first empirical investigations of the relationship in the Czech context was conducted by Menčlová (2014) who used bivariate correlation analysis between entrepreneurship and unemployment, analysed the period of years 1992-2011. Menčlová (2014) obtained negative correlation coefficient for joint-stock companies and companies

with limited liabilities, however she reported no statistically significant impact of economic recession during the years 2008-2010. More robust econometric approach was applied by Hájek et al. (2015) who analysed the Czech micro-regions during the period of years 2011-2012. Hájek et al. (2015) estimated regression models with parameters lagged up to two years, however they were unable to find any statistically significant impact of unemployment on entrepreneurial activity. Different result was obtained by Dvouletý and Mareš (2016b) who analysed the impact of unemployment rate on entrepreneurial activity using annual data for the NUTS 3 regions for the period of years 1995-2013 and who obtained statistically significant, positive influence. This contradictory findings may be caused by the length of the analysed period. Another reason could be the fact that Hájek et al. (2015) did not expressed entrepreneurial activity per capita, but only in absolute numbers.

To shed more light on the dynamics of the relationship between entrepreneurship and unemployment in the Czech context I apply methodological approach of Koellinger and Thurik (2012) and I empirically estimate vector autoregressive (VAR) models with impulse response function with the purpose to analyse the dynamics of the relationship. My tested hypothesis is stated below:

H1: There was a positive relationship between dynamics of unemployment rate and entrepreneurial activity during the period of years 2003-2014 in the Czech NUTS 3 regions.

5.3. Data

Obtained data come from the Czech Statistical Office (CZSO, 2016) and cover the 14 Czech NUTS 3 regions quarterly from the first quarter of 2003 (2003Q1) to the last quarter of 2014 (2014Q4). Collected dataset consists of 672 observations for each of the two variables, total amount of registered businesses in the region at the end of quarter (*Entrepreneurial_Activity*) and unemployment rate (*Unemployment_Rate*) in percentages. Advantage of this approach is that the period starting from 2003 is not affected by the relatively turbulent years after the establishment of the Czech Republic (90s), when the entrepreneurial activity grew rapidly. Disadvantage of this dataset is that quarterly NUTS 3 regional data do not contain any other

explanatory variables, such as GDP per capita. All outputs come from the econometric software EViews 9.

Total amount of registered businesses at the end of each quarter is used as operationalization of entrepreneurial activity in the Czech regions. Limitation of this approach is that population of registered businesses covers also enterprises that are registered, but no longer active. On the other hand, registered business activity does not cover nascent entrepreneurship (Koellinger and Thurik, 2012). To solve this issue, data depicting entrepreneurial activity obtained from the population surveys such as Global Entrepreneurship Monitor would be needed. However sufficiently long time series for the Czech Republic are still unfortunately not available (GEM, 2016).

From the Table 1 presenting the descriptive statistics, can be clearly seen that on average the highest level of entrepreneurial activity was during the analysed period in the Capital region Praha, which is suspected for being an outlier. On the opposite, on average, the lowest level of entrepreneurship was reported in Karlovarsky region. On average, 180 980 registered enterprises per region at the end of quarter, were registered in the Czech Republic during the period of years 2003-2014.

Table I: **Descriptive statistics for the amount of registered businesses across the Czech regions**

REGION	MEAN	MEDIAN	MAX	MIN	N
Jihocesky	151161	151991	160786	137820	48
Jihomoravsky	274323	275973	300204	242366	48
Karlovarsky	78178	76812	83797	71604	48
Kralovehradecky	128815	129851	135996	117234	48
Liberecky	113177	113681	119925	103837	48
Moravskoslezsky	237943	240794	250028	218454	48
Olomoucky	133188	134171	139552	124497	48
Pardubicky	108734	109486	116363	97117	48
Plzensky	135602	137492	148471	119532	48
Praha	476275	473504	557736.0	399030	48
Stredocesky	291040	294448	323025	248513	48
Ustecky	171315	172417	179845	157353	48

Vysocina	100901	101371	108800	92000	48
Zlinsky	133077	133185	138832	124525	48
All	180980	136754	557736	71604	672

(Source: **EViews, author´s elaboration, in units)**

Summary statistics for unemployment rate can be found in the Table 2. As expected one can see significant differences among the Czech regions. The lowest level of unemployment rate was on average in the Capital Praha and the highest level of unemployment rate was reported in Ustecky region. Average unemployment rate was at the end of quarter during the observed period in the Czech regions 6.9%. Overview of the both descriptive statistics indicated substantial heterogeneity across the Czech regions which could affect the estimation of econometric models.

Table II: Descriptive statistics for unemployment rate across the Czech regions

REGION	MEAN	MEDIAN	MAX	MIN	N
Jihocesky	4.90	5.12	6.89	1.93	48
Jihomoravsky	7.12	7.57	8.92	4.21	48
Karlovarsky	9.39	9.59	12.44	5.59	48
Kralovehradecky	6.15	6.06	9.48	3.17	48
Liberecky	6.96	6.76	9.90	4.13	48
Moravskoslezsky	10.69	9.85	15.50	6.81	48
Olomoucky	8.41	8.25	12.26	5.60	48
Pardubicky	6.30	6.43	9.50	3.45	48
Plzensky	5.05	5.19	7.08	3.18	48
Praha	3.16	3.28	4.54	1.73	48
Stredocesky	4.67	4.93	6.16	2.50	48
Ustecky	11.11	10.73	15.24	7.27	48
Vysocina	5.82	6.09	7.81	2.80	48
Zlinsky	7.04	7.20	10.39	3.48	48
All	6.91	6.62	15.50	1.73	672

(Source: **EViews, author´s elaboration, in %)**

5.4. Stationarity and Seasonality

Besides the present heterogeneity over time and across the regions, one needs to deal with the two issues, connected to the empirical work with the quarterly panel. Those econometric issues are stationarity and seasonality. Stationarity condition requires for both variables to have relatively constant mean and constant variance over the time and across units, otherwise the results could provide spurious regression estimates, as pointed out by Newbold and Granger (1974). To ensure the stationarity of the variables Baltagi (2016) suggests to use unit root tests. Therefore I employ unit root test in version of Levin et al. (2002) integrated in EViews 9. This test assumes on the null hypothesis that the variable is non-stationary. On the 5% level of the statistical significance I was unable to reject the null hypothesis of non-stationarity for the both variables, as they are denominated in the Tables 1 and 2.

Seasonality present in quarterly data, could be one source of non-stationarity of the variables and therefore I follow the approach suggested by Tsay (2010) and transform the both variables into annual seasonal differences for unemployment rate expressed in percentages (*Unemployment_Growth*) and seasonal percentage changes for the variable, which represents entrepreneurial activity (*Entrepreneurship_Growth*). Interpretation of the variables in the regression analysis is hence percentage change over the same quarter of the previous year. This solution stabilizes both, mean and variance of the both variables and ensures that the results will not be affected by seasonality and non-stationarity.

Additional testing of stationarity on 5% level of the statistical significance rejected the null hypothesis of non-stationarity for both variables expressed as annual percentage change and allowed me to accept the alternative hypothesis, stating that the both variables are stationary. This result allows me to proceed towards the estimation of vector autoregressive (VAR) models.

5.5. Results and Discussion

To investigate the dynamics of entrepreneurial activity and unemployment rate I estimate vector autoregressions (VAR). For the empirical estimation on the panel data, variables need to be stationary and one needs to decide about the optimal lag length according to Holtz-Eakin et al. (1988). Hušek (2009) suggests to use for lag selection information criteria. The impact of unemployment rate on entrepreneurship is then interpreted based on the results of the Granger causality test, testing the time dependency and the ability to forecast each of the variable (Granger, 1969), and based on the construction of impulse response function applying Choleski´s decomposition (Hušek, 2009).

To ensure that the results will not be biased by the economic recession, which lasted during the period of years 2008-2010, I added to estimation exogenous dummy variable covering this period (*Crisis2008_2010*) and another dummy variable controlling for the region with the Capital - Praha (*Praha*). Regressions were also estimated without the region Praha. However excluding the region Praha from the analysis did not have any impact on the obtained results. The dummy variable representing the region Praha (*Praha*) was however kept in the estimated models, because it was variable increasing the amount of explained variance by the model without having any impact on on presented results.

Based on the described approach I have estimated model VAR (8) which was selected based on the best values of information criteria. From the econometric verification perspective I have controlled for the presence of AR roots and I also checked the correlogram of residuals. No systematic patterns were observed and no AR roots detected. Choosing specification of 8 lags, equal to two years as, is also in accordance with the previously published studies (Koellinger and Thurik, 2012). I have also estimated the control model VAR (4), which is more parsimony, but the model reported similar results, nevertheless the model VAR (8) was selected due to its better explanatory power. As already mentioned before, model VAR (8) reported the best values of information criteria. Estimated model satisfies condition of stability and the model is presented in the Table 3 below. R-Squared (0.80) and F-statistics (104.8) related to the key equation with the dependent variable

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Entrepreneurship_Growth inform us that the model fit is good. Therefore we may proceed towards the interpretation of obtained results.

Table III: Estimated VAR (8), 504 observations, standard errors are in parentheses

VARIABLE	*Entrepreneurship_Growth*	*Unemployment_Growth*
Entrepreneurship_Growth(-1)	1.007	0.0001
	(0.045)	(0.043)
Entrepreneurship_Growth(-2)	-0.112	0.012
	(0.064)	(0.061)
Entrepreneurship_Growth(-3)	0.033	0.004
	(0.064)	(0.061)
Entrepreneurship_Growth(-4)	-0.779	0.029
	(0.061)	(0.058)
Entrepreneurship_Growth(-5)	0.791	-0.035
	(0.070)	(0.066)
Entrepreneurship_Growth(-6)	-0.109	0.029
	(0.078)	(0.075)
Entrepreneurship_Growth(-7)	0.012	-0.019
	(0.077)	(0.073)
Entrepreneurship_Growth(-8)	-0.091	0.008
	(0.058)	(0.055)
Unemployment_Growth(-1)	-0.155	0.831
	(0.047)	(0.045)
Unemployment_Growth(-2)	0.025	0.121
	(0.062)	(0.059)
Unemployment_Growth(-3)	-0.063	-0.096
	(0.062)	(0.059)
Unemployment_Growth(-4)	0.070	-0.559
	(0.061)	(0.058)
Unemployment_Growth(-5)	0.017	0.254
	(0.060)	(0.057)
Unemployment_Growth(-6)	-0.025	0.135
	(0.062)	(0.059)
Unemployment_Growth(-7)	-0.051	-0.003
	(0.062)	(0.059)
Unemployment_Growth(-8)	0.158	-0.159
	(0.048)	(0.046)
Constant	0.066	-0.215

	(0.079)	(0.075)
Crisis2008_2010	0.544	0.391
	(0.106)	(0.101)
Praha	0.509	-0.052
	(0.172)	(0.164)
R-squared	**0.796**	**0.753**
Adj. R-squared	**0.788**	**0.743**
F-statistic	**104.826**	**82.004**

Table 4 presents the results of the VAR (8) Granger Causality/Block Exogeneity Wald tests. On 5% level of the statistical significance I reject the null hypothesis of non-existence of the relationship between the annual percentage change of unemployment rate and entrepreneurial activity. I accept the alternative hypothesis stating that the relationship in sense of Granger causality during the analysed period existed. The relationship is further analysed through the impulse response function.

Table IV: VAR (8) Granger Causality/Block Exogeneity Wald Tests

VARIABLE	CHI-SQ	P-VALUE	H_0 REJECT
Unemployment_Growth	55.24371	0.00	Rejected
All	55.24371	0.00	Rejected

Figure 1 presents the estimated impulse response function for the development of the dependent variable, annual percentage change of the entrepreneurship (*Entrepreneurship_Growth),* after the shock in annual percentage change in unemployment rate (*Unemployment_Growth)*. Right after the increase in unemployment rate growth, the entrepreneurial activity started to decrease and reached its bottom between the fourth and fifth quarter, after which started to increase back to its initial state, reaching it by around seventh quarter. Entrepreneurial activity continued rising until it reached its peak after eight quarters and resulted in higher level of entrepreneurship growth compared to its initial state. Finally, after the twelve quarters the shock slowly disappeared.

Figure 1: *Response of Entrepreneurship_Growth to Cholesky one s. d. Unemployment_Growth innovation*
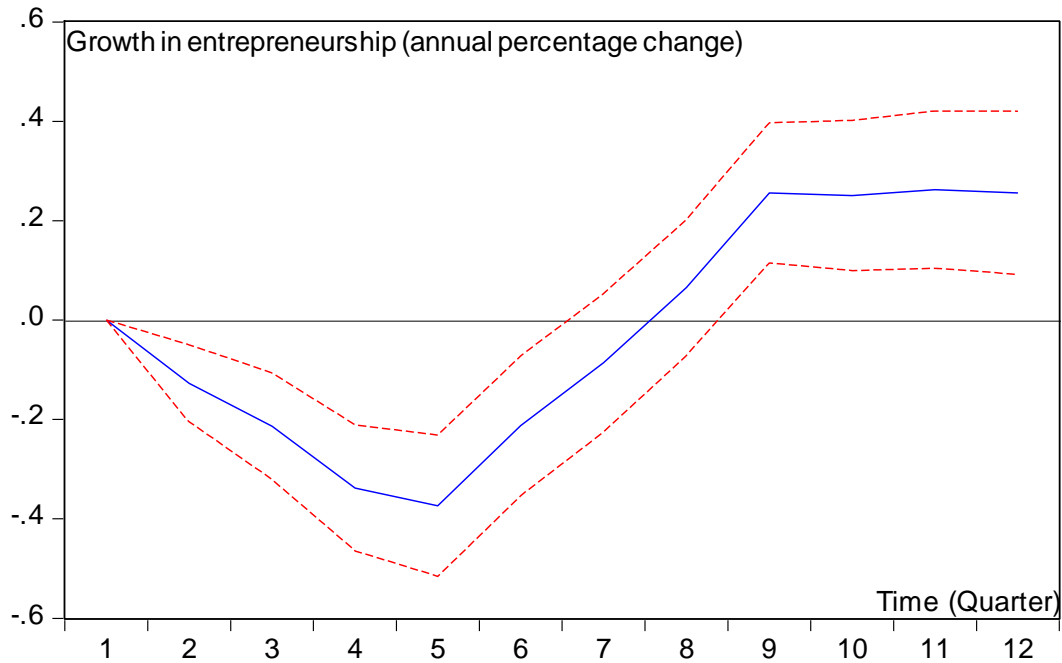
(Source: EViews, author´s elaboration)

Estimated impulse response function shows that two years after the unemployment shock, the growth in the amount of new enterprises exceeds the shutdown of established enterprises and results in the higher level of entrepreneurial activity compared to its initial state, which is a supportive argument for the stated **H₁** assuming a positive relationship between unemployment and entrepreneurship dynamics during the analysed period of years 2003-2014. Obtained findings are also in consensus with the results reported previously by Dvouletý and Mareš (2016b). However it looks like that the positive response of entrepreneurship dynamics is not that fast and that it takes about two years for entrepreneurial activity to growth above its initial level after the increase in unemployment rate.

This finding can be supported by the results obtained by Belás et al. (2015) who argue that the most important motive for starting a business in the Czech Republic was to have a job. Results obtained by Hájek et al. (2015) may be different due to investigation of the relatively short period of time, covering only years 2011-2012. Perhaps enlargement of their dataset by additional years would bring positive relationship between entrepreneurship and unemployment too. Authors should also work with the data that, which are comparable across the Czech regions, and hence apply transformation into percentage changes, or authors should calculate entrepreneurial activity per capita or per economically active inhabitant, as it is usually done by entrepreneurship scholars (see e. g. Fritsch et al., 2015, Berkowitz and DeJong, 2005) or in the methodology of Global Entrepreneurship Monitor (GEM, 2016).

5.6.   Conclusion

Presented article aimed to investigate the dynamics of unemployment rate and entrepreneurial activity in the Czech NUTS 3 regions over the period of years 2003-2014 using quarterly data. Empirical part of the article applied methodology used by Koellinger and Thurik (2012) and estimated vector autoregressive (VAR) models with the construction of impulse response function. Obtained results revealed the dynamics between unemployment and entrepreneurship, supporting arguments regarding the presence of necessity entrepreneurship in the Czech regions. However it took up to two years for entrepreneurship growth to increase above its initial level and therefore the positive response of entrepreneurship towards an economic decline takes in the Czech Republic some time.

Based on obtained findings, entrepreneurial activity increases above its initial state, two years after the shock in unemployment rate. Entrepreneurship policy makers should discuss the alternative to support individuals struggling with an engagement into entrepreneurship, particularly prepare set of actions, guiding potential entrepreneurs through the process of business start-up and therefore speed up the process of founding enterprises which could lead to acceleration of the total increase in entrepreneurial activity with all its positive externalities. Therefore I advise policy makers who are responsible for

entrepreneurship policies to put more effort into the support of entrepreneurship in the Czech Republic, especially during the times of higher unemployment rate. Importance of the need to focus entrepreneurship policies on unemployed has already been pointed out by the previous researchers (e. g. Lukeš et al., 2014, Dvouletý and Lukeš, 2016 or Dvouletý and Mareš, 2016b), who suggest to support entrepreneurship through the organization of trainings, workshops and allocation of the resources towards entrepreneurial infrastructure (e. g. science parks and business incubators).

Other initiatives supporting monitoring of entrepreneurial activity on the regional level, such as Global Entrepreneurship Monitor (GEM), are needed for robustness check of obtained results. One extension on the presented article perceived as a challenge for future research is to estimate separate econometric models for different forms of entrepreneurial activity, e. g. self-employment and business companies and to investigate their dynamics with the business cycle (Dvouletý and Mareš, 2016c). Future research in the Czech Republic needs to also address the impacts of entrepreneurship policies and to evaluate their effectivity and influence on the new business formation (Dvouletý and Lukeš, 2016; Mirošník et al., 2016 or Blažková, 2016).

5.7. References

BAPTISTA, R., & THURIK, A. R. 2007. The relationship between entrepreneurship and unemployment: Is Portugal an outlier? *Technological Forecasting and Social Change*, *74*(1): 75-89.

BALTAGI, B. 2016. *Econometric analysis of panel data*, 5th ed.: John Wiley & Sons, 373 p., ISBN 978-1-118-67232-7.

BELÁS, J., DEMJAN, V., HABÁNIK, J., HUDÁKOVÁ, M., and SIPKO, J. 2015. The business environment of small and medium-sized enterprises in selected regions of the Czech Republic and Slovakia. *E+M Ekonomie a Management*, (1): 95-111.

BERKOWITZ, D., and DE JONG, D. N. 2005. Entrepreneurship and post-socialist growth. *Oxford bulletin of economics and statistics*, *67*(1): 25-46.

BLAŽKOVÁ, I., 2016. The Impact of the Public Support for R & D on the Economic Performance of SMEs. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *64*(1): 213-222.

CONGREGADO, E., GOLPE, A. A., and PARKER, S. C. 2012. The dynamics of entrepreneurship: hysteresis, business cycles and government policy. *Empirical Economics*, *43*(3): 1239-1261.

CARREE, M. and THURIK, A. 2010. The impact of entrepreneurship on economic growth. *Handbook of entrepreneurship research*. Springer, New York, 2010.

CZSO, CZECH STATISTICAL OFFICE. 2016. *Regional time series.* [online]. Available from: https://www.czso.cz/csu/czso/trh-prace-v-cr-casove-rady-1993-az-2014. [Accessed. 2016, July 19].

CUETO, B., MAYOR, M., and SUÁREZ, P. 2015. Entrepreneurship and unemployment in Spain: a regional analysis. *Applied Economics Letters*, 22(15): 1230-1235.

DVOULETÝ, O. 2017. Determinants of Nordic entrepreneurship *Journal of Small Business and Enterprise Development*, 24(1).

DVOULETÝ, O., and LUKEŠ, M. 2016. Review of Empirical Studies on Self-Employment out of Unemployment: Do Self-Employment Policies Make a Positive Impact? *International Review of Entrepreneurship*, 14(3): 361-376.

DVOULETÝ, O., and MAREŠ, J. 2016a. Relationship between unemployment and entrepreneurial activity: Evidence found among Visegrad countries. In *4th International Conference: Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS)*. University of Economics in Prague, 146-156.

DVOULETÝ, O., and MAREŠ, J. 2016b. Determinants of regional entrepreneurial activity in the Czech Republic. *Economic Studies & Analyses/Acta VSFS*, 10(1): 31-46.

DVOULETÝ, O., and MAREŠ, J. 2016c. Entrepreneurial activity in the Czech regions: Are business companies and self-employed individuals affected by the same factors? In *10th International Days of Statistics and Economics*, University of Economics in Prague, 418-428.

FOTOPOULOS, G. 2014. On the spatial stickiness of UK new firm formation rates. *Journal of Economic Geography*, *14*(3): 651-679.

FRITSCH, M., KRITIKOS, A., and PIJNENBURG, K. 2015. Business cycles, unemployment and entrepreneurial entry - evidence from Germany. *International Entrepreneurship and Management Journal*, 11(2): 267-286.

GEM, GLOBAL ENTREPRENEURSHIP MONITOR. 2016. *Adult Population Survey Measures.* [online]. Available from: http://www.gemconsortium.org/data/key-indicators. [Accessed. 2016, July 19].

GRANGER, C. W. 1969. Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*: 424-438.

GRILO, I., and THURIK, R. 2004. Determinants of entrepreneurship in Europe. *ERIM Report Series*, (Reference No. ERS-2004-106-ORG).

HÁJEK, O., NEKOLOVÁ, J., and NOVOSÁK, J. 2015. Determinants of New Business Formation-Some Lessons from the Czech Republic. *Economics & Sociology*, *8*(1): 147.

HOLIENKA, M., JANČOVIČOVÁ, Z. and KOVAČIČOVÁ, Z., 2016. Women Entrepreneurship in Visegrad Region and its Drivers. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *64*(6): 1899-1910.

HOLTZ-EAKIN, D., NEWEY, W., and ROSEN, H. S. (1988). Estimating vector autoregressions with panel data. *Econometrica: Journal of the Econometric Society*: 1371-1395.

HOOVER, K. D., JOHANSEN, S., and JUSELIOUS, K. 2008. Allowing the data to speak freely: The macroeconometrics of the cointegrated vector autoregression. *The American Economic Review*, *98*(2): 251-255.

HUŠEK, R. 2009. *Aplikovaná ekonometrie: teorie a praxe,* first edition Praha: Oeconomica, 344 p.

KLAPPER, L., LOVE, I., and RANDALL, D. 2015. New firm registration and the business cycle. *International Entrepreneurship and Management Journal*,*11*(2): 287-306.

KOELLINGER, P. D., and THURIK, A. R. 2012. Entrepreneurship and the business cycle. *Review of Economics and Statistics*, *94*(4): 1143-1156.

LEVIN, A., LIN, C.-F., and CHU, J. C.-S. 2002. Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of Econometrics*, *108*(1): 1–24.

LLOPIS, J. A. S., MILLÁN, J. M., BAPTISTA, R., BURKE, A., PARKER, S. C., and THURIK, R. 2015. Good times, bad times: entrepreneurship and the business cycle. *International Entrepreneurship and Management Journal*, *11*(2): 243-251.

LUKEŠ, M., JAKL, M., and ZOUHAR, J. 2014. *Podnikatelská aktivita v České republice.* [online]. Available from: http://www.mpo.cz/dokument149362.html. [Accessed. 2016, July 19].

LUKEŠ, M., and ZOUHAR, J. 2016. The Causes of Early-Stage Entrepreneurial Discontinuance. *Prague Economic Papers*, *2016*(1): 1-19.

MENČLOVÁ, B. 2014. Economic Development and Number of Business Entities. *Český finanční a účetní časopis*, *2014*(4): 166-174.

MIROŠNÍK, K., ČADIL, J. and ČERMÁKOVÁ, K., 2016. Small business and cohesion policy-statistical evidence from the Czech Republic. *International Journal of Entrepreneurship and Small Business*, *29*(3): 398-415.

NEWBOLD, P., and GRANGER, C. 1974. Spurious regressions in econometrics. *Journal of Econometrics*, *2*(2): 111-120.

PARKER, S. C. 2009. *The economics of entrepreneurship*. Cambridge University Press.

POLOK, D., MICHALSKI, P., SZEWCZYK, D., KEIL, D., WIECZORE, S., KACIAKOVA, P., INCZE, Z., RYCERZ, J., NISZTUK, T., DVOULETÝ, O., and KRZEMIŇSKI, P. 2016. *Future of the Visegrad Group.* [online]. Available from: http://paga.org.pl/projekty/raport-future-of-the-visegrad-group/future-of-the-visegrad-group/report?lang=en. [Accessed. 2016, July 19].

STRÝČKOVÁ, L. 2015. Factors determining the corporate capital structure in the Czech Republic from the perspective of business entities. *E+M Ekonomie a Management*, 1(2): 40-57.

ŠEBESTOVÁ, J., KLEPEK, M., ČEMERKOVÁ, Š. and Adámek, P., 2015. Regional Entrepreneurship Culture and the Business Lifecycle: Patterns from the Moravian-Silesian Region. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *63*(6): 2137-2144.

TSAY, R. S. 2010. *Analysis of Financial Time Series,* Third Edition*:* John Wiley & Sons, 714 p.

WELTER, F., and SMALLBONE, D. 2011. *Handbook of Research on Entrepreneurship Policies in Central and Eastern Europe,* first edition Cheltenham: Edward Elgar Publishing, 261 p.

6. Does the Self-employment Policy Reduce Unemployment and Increase Employment? Empirical Evidence from the Czech Regions[7]

Abstract

Empirical evidence related to the effectivity and outcomes of the self-employment programmes in the Central and Eastern Europe is still very rare, despite the important role of entrepreneurship in the economic development of post-communist economies. The main purpose of this study was to empirically investigate the impact of self-employment subsidy for unemployed in the Czech NUTS 3 regions for the period of years 2012-2015 to provide policy makers a supportive material useful for policy adjustments. The study applies quantitative research framework, which is based on the construction of econometric models. Estimated regression models with region fixed effects supported the negative impact of the amount of supported self-employed on the unemployment rates in the Czech regions. This finding is theoretically framed by the theory of necessity entrepreneurship. However econometric estimates could not support the hypothesis, assuming a positive impact of the self-employment programme on the regional employment rates. Positive spillover of the programme ("a double dividend"), was not empirically proved. Analysis of the costs revealed that the costs of the self-employment programme are not that high, if one takes into account alternative costs of the unemployment benefits paid to unemployed and social insurance paid back to the state by the newly established self-employed. Therefore this tool of active labour market policy has a potential of wider usage. Nevertheless, applied empirical strategy was based on the regional level and has its limitations. Provided results needs to be

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interpreted with caution, because the true outcomes of the programme could be analysed only on the level of supported individuals. Future research should therefore challenge the effectiveness of the start-up subsidy programmes in the Czech Republic on the level of individuals with focus on the survival rates of subsidized businesses and incomes of their formerly unemployed owners.

Keywords: Self-employment Policy Evaluation, Self-employment Programme, Start-up Subsidy, Entrepreneurship Policy, Unemployment Rate, the Czech NUTS 3 regions, Regression Analysis

JEL Codes: J08, L53, L26

6.1. Introduction

Public policies have been identified as a set of tools affecting particular individuals with the aim to achieve a particular goal. In the public policy analysis one aims to investigate the content of public policies, their processes, outcomes and the main purpose is to deliver practical recommendations which could serve as a material for policy makers and support for future policy adjustments (e. g. Veselý et al., 2016 or Hejzlarová, 2014). This article is focused on the analysis of public policies related to the labour market. The main goal of the labour market policies is to prevent economically active inhabitants from the unemployment (or to transform unemployed back to employment) and to prevent them from falling into the long-term unemployment which is often linked with the social exclusion. Labour market policies are usually divided into the two groups, passive labour market policies (PLMP) aiming to provide unemployed with information about the job vacancies and to distribute unemployment support; and active labour market policies (ALMP) which aim to establish labour market balance through the system of programmes supporting the highest possible level of employment. Tools of ALMP often include retraining, investment incentives, establishment of socially beneficial jobs and self-employment programmes (e. g. Adámek and Dobřilovský, 2012; Krebs, 2010 or Flek and Večerník, 2005). Transfer from unemployment into self-employment (entrepreneurship) was identified by the policy makers

as a convenient way how to not only reduce unemployment, but also how to create new jobs by formerly unemployed individuals for others and how to further decrease unemployment rates (e. g. Caliendo and Künn, 2014 or Dvouletý and Lukeš, 2016).

Evaluation of the self-employment programmes is a challenging topic investigated by entrepreneurial scholars and labour economists all over the world. Recently published studies (e. g. Acs et al., 2016; Caliendo et al., 2016; Wolff et al., 2016; Fritsch et al., 2015, Klapper et al., 2015; Zouhar and Lukeš, 2015 or Zouhar et al., 2015) which analyse the impact of self-employment programmes, as a part of active labour market policies on individual, regional or country level, indicate that the impacts of entrepreneurship policies are not fully conclusive and require further research attention. Dvouletý and Lukeš (2016) in their literature review focused on self-employment out of unemployment, summarized empirical approach, level of analysis, variables and empirical findings of the studies published in the past ten years and conclude that if the main aim of self-employment policies is to reduce unemployment, then the policies fulfil this goal. However they further point out that it is necessary to conduct empirical studies assessing the outcomes of different programmes and compare them within each other, since the results may differ not only geographically but also over the time periods.

Empirical evidence related to the effectivity and outcomes of self-employment programmes in the Central and Eastern Europe is still very rare, despite the important role of entrepreneurship in the economic development of post-communist economies (e. g. Polok et al., 2016 or Welter and Smallbone, 2011). Večerník (2011) further points out that the involvement of the Czech population in self-employment is among the highest in the European Union. Self-employment is also the most frequent form of entrepreneurship in the Czech Republic (e. g. Lukeš et al., 2014 or Chládková, 2010). One explanation behind the high level of engagement in self-employment is that significant share of self-employed work as contractors for only one employer under so called "švarc system" conditions ("false", or "shadow" self-employment), working in reality as full-time employees . This behaviour is against the law, however it still occurs due to the high potential benefits for employers, who

do not have to pay for social and health insurance of their self-employed contractors (e. g. Jirásková, 2013 or Dvoulecký and Mareš, 2016a). Motivation for this paper is therefore to empirically contribute to the regional knowledge about the outcomes of self-employment programmes, by the example of the Czech governmental supportive programme providing start-up subsidies for unemployed. The need to study effects of entrepreneurship policies in the Czech Republic has also been raised by the Czech entrepreneurial scholars recently (e. g. Hlaváček et al., 2015; Mandysová, 2012 or Dvoulecký and Mareš, 2016a).

The main aim of the study is hence to assess the costs of the programme and to analyse the outcomes of the start-up subsidy for unemployed in the fourteen Czech NUTS 3 regions during the period of years 2012-2015. Applied empirical approach follows the quantitative research framework. Econometric models analysing the outcomes of the programme on the regional level are utilized to fulfil the research objective. Obtained results have clear implications for policy makers and help them to form active labour market/entrepreneurship policies based on empirical evidence, despite the fact that conducted analysis of the programme from the aggregated perspective has its limitations (Calmfors, 1994). The structure of the article is further as follows. The next section (1) presents the specifics of self-employment in the Czech context and discusses the relationship between the self-employment and unemployment with respect to the previous empirical findings. The second part of the article (2) presents the self-employment programme, its costs, regional allocation of the funds and forms tested hypotheses. Section three (3) is dedicated to the introduction of the collected dataset and descriptive statistics. In the fourth part (4) are presented estimated econometric multivariate regression models, discussed obtained coefficients and stated limitations. The final section of the study is dedicated to the summary of obtained findings, policy recommendations and avenues for future research.

6.2. Self-employment and Unemployment

Characteristics of individuals who are considered as self-employed do not lead to the clear definition of self-employment, nor in international scientific debate, nor in the Czech Republic (Petrescu, 2016). Generally, are Czech self-employed individuals those who

independently run an enterprise, who bear risks for their activities and who receive profits (e. g. Pavlíček, 2014 or Průša et al., 2009). This simple definition does not give us an answer whether the individual runs a business as its primary or secondary activity, how much effort and time is allocated to the entrepreneurial activity, whether the individual is an entrepreneur having employees or an own-account worker having stable contract with one employer. Self-employment may also include people who are only partially managing their business or having self-employment as a hobby activity (e. g. Pavlíček, 2014 or Večerník, 2011). However for the purpose of this study the most important attribute for self-employed is the ability to run an independent business activity and responsibility for own behaviour and risks.

Connection among the self-employment, entrepreneurship policies/active labour market policies (ALMP) and unemployment rate is established through the theory of necessity entrepreneurship. Necessity entrepreneurship provides an alternative choice for those individuals who were unable to get better alternative opportunity on the labour market and therefore they do not have to end up in unemployment. Self-employment serves then as a way out of unemployment. (e. g. Fritsch et al., 2015, Bosma and Harding, 2006 or Reynolds et al., 2005). Therefore the relationship between the necessity entrepreneurship and unemployment rate is dynamic and it is linked to the business cycle. During the times of economic growth, self-employment rates may be lower, because the necessity entrepreneurs perceive better alternative opportunities on the labour market compared to their incomes received from self-employment. The opposite situation is once the economy falls into a recession and unemployment rate increases, some individuals become self-employed to obtain income to pay costs for their living. (e. g. Fritsch et al., 2015; Cueto et al., 2015; Román et al., 2013 or Parker, 2009).

The idea behind the self-employment programmes is to engage unemployed individuals to join entrepreneurial activity and to support their efforts, because participation in any economic activity helps unemployed to maintain their working habits, skills and to increase their work experience. Self-employment then prevents formerly unemployed from

falling into the long-term unemployment, which may result in social exclusion and poverty. Public support commonly includes non-repayable capital grants, counselling and entrepreneurial trainings. The most important outcome from the angle of public authorities is the reduction of unemployment. Effectivity of the programmes may nevertheless differ over time and across the regional conditions and therefore each of the programmes needs to be assessed with respect to the local conditions. Evaluations are commonly conducted on the level of state, region or individual, whereas the assessments on individual level allow to take into account individual characteristics and analyse outcomes of the programme not only on employment status, but also on the size of income. Unfortunately, to collect data on individual level requires strong cooperation between the researchers and public authorities, which is not always successful (e. g. Dvouletý and Lukeš, 2016; Wolff et al., 2016; Audretsch et al., 2015; Soukup, 2011 or Caliendo and Kritikos, 2010).

When it comes to the relationship between self-employment and unemployment in the Czech Republic, several empirical investigations have been made so far. Bivariate correlations between the number of self-employed and unemployment rate have been used to study the relationship by Menčlová (2014) and Pavlíček (2014). Menčlová (2014) was unable to find any statistically significant relationship, contrary to Pavlíček (2014) who found a positive relationship between the unemployment rate and the number of self-employed. Dvouletý and Mareš (2016c) used regression analysis and found that increased unemployment rate was associated with higher self-employment activity in the Czech regions. In their second study Dvouletý and Mareš (2016b) provided an empirical evidence showing that the increase in the amount of active enterprises was associated with lower unemployment rates. However they have not distinguished among different forms of entrepreneurship. Dvouletý (2017) proved that during the period of years 2000-2015, the higher rates of self-employment were associated in the Czech regions with the lower unemployment rates. Effectivity of active labour market programs in the Czech Republic have been tested by Hora and Sirovátka (2012) who managed to collect individual data of participants taking part in ALMP programmes. On the data for years 2007 and 2009, they conclude, that participation in self-employment programme was associated with decreased

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probability of return into unemployment. Unfortunately, up-to date study focused specifically on the outcomes of self-employment programmes in the Czech Republic is to the best knowledge of author still missing, despite the fact that many scholars call for it (e. g. Hlaváček et al., 2015; Mandysová, 2012 or Dvoulety and Mareš, 2016a). Therefore I introduce to the reader self-employment programme for unemployed as it is currently established in the Czech Republic, collected dataset and empirical approach towards the evaluation of the programme during the years 2012-2015 in the next sections of this article.

6.3. Start-up Subsidy Programme[8] for Unemployed in the Czech Republic

Self-employment subsidy for unemployed has been used in the Czech Republic as a part of active labour market policy since 2004. Unemployed individuals may ask for a subsidy to establish socially beneficial business and receive a financial support equal to a maximum of six average monthly wages if the unemployment rate in the region is equal or higher to the national unemployment rate. If the regional unemployment is lower than national unemployment rate, then the maximum amount of subsidy is equal to the four average monthly wages. If the new entrepreneur creates more than ten new job opportunities, then the amount of subsidy is increased by the financial amount equal to two average monthly wages. The choice to participate in the programme depends on the character, skills and mainly on the motivation of unemployed individual. In principle, unemployed applicants need to create a business plan, cost structure, consult and defend their own idea in front of the labour office committee. Approved amount of the subsidy finally depends on the cost structure, business idea and it is allocated to the newly self-employed after signing the

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[8] In Czech "Příspěvek na zřízení společensky účelného pracovního místa (SÚPM) zřízeného uchazečem o zaměstnání za účelem výkonu samostatně výdělečné činnosti" (Czech Employment Law, 435/2004).

contract (after the new business is officially registered). Newly created enterprise needs to sustain at least for 365 days. Preferred for programme are applicants, who formerly accomplished retraining course "foundations of entrepreneurship." The advantage is that the retraining course often includes orientation part which may discourage some unemployed from a "bad" decision to start self-employment (based on unrealistic expectations), to make debts by entrepreneurship and as a consequence to further worsen their situation instead of expected improvement. Applicants who successfully accomplished the course are hence more likely to form clear expectations about their future business activity. Approval of the subsidy is made by the regional labour office, since this subsidy is allocated regionally. One also needs to point out, that sometimes the regional labour offices attach for applicants additional specific requirements. Once the deal is signed and the enterprise is established, newly self-employed starts paying social insurance and health insurance and quits the unemployment (Ministry of Labour and Social Affairs, 2016; Czech Employment Law, 435/2004).

Unfortunately, the reporting system of the Ministry of Labour and Social Affairs does not provide detailed statistics about the programme and it is generally very difficult to collect any data. Based on the internal data obtained from the Ministry and the data collected from the statistical Yearbooks, I have created Table 1, depicting the amount of supported individuals and funds allocated towards the self-employment programme for the period of years 2012-2015. This time restriction is caused by the data availability, since longer time series on the regional level are not currently accessible. Based on the amount of supported self-employed I have calculated the average costs per subsidized enterprise (fourth column) and compared it with the opportunity costs for unemployed, quantified as the amount of paid unemployed support for the period of six months (last column). One can observe that the direct costs of the programme were with exception of year 2012 higher, compared to the unemployment support, however not dramatically. It is also important to note, that once individuals join self-employment, they automatically need to start paying for the health and social insurance. Social insurance is a part of the state revenues. Therefore the direct costs of the programme are being paid back through the social insurance and taxes (if are any

reported). If the self-employed continuously pays the minimum amounts of social insurance and the subsidized business survives at least for two years, then the direct costs of the programme are paid back in about two years.[9] Even from the perspective of unemployed, it looks more advantageous to engage self-employment compared to staying in unemployment. However the results of the cost benefit analysis may change over the time.

Table 2: Cost-benefit Analysis of the Self-employment Programme for the whole Czech Republic (denominated in CZK, 27 CZK ≈ 1 EUR, Legend from the left; *Resources allocated*: total amount of financial resources allocated to the self-employment programme, *Self-employed Supported*: total amount of individuals supported by the self-employment programme, *Costs per one Self-employed*: costs are calculated as a ratio of allocated funds and number of supported individuals. *Average Unemployment Support*: For the support in unemployment (unemployment benefits) is used annual average support, *Average Unemployment Support for 6 months*: average unemployment support multiplied by six).

Year	Resources Allocated	Self-employed Supported	Costs per one Self-employed	Average Unemployment Support	Average Unemployment Support for 6 months
2012	74 558 000	2 821	26 430	5 892	35 352
2013	122 426 000	2 776	44 102	6 284	37 704
2014	128 076 990	3 054	41 937	5 958	35 748
2015	147 157 380	3 212	45 815	6 171	37 026

Source: Ministry of Labour and Social Affairs (2012, 2013, 2014, 2015, 2016), own calculations

From the regional perspective, subsidies were more distributed in the regions suffering from the higher unemployment rates. On Figure 1, reader can observe per capita allocation towards the Czech NUTS 3 regions. The highest per capita subsidies were on average during the period of years 2012-2015 allocated towards the regions Vysocina, Moravskoslezsky and Jihomoravsky compared to the lowest amounts, which were

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[9] For example in 2015, the minimum social insurance for 12 months = 23 664; 45 815 – 23 664 = 22 151 CZK (Czech Social Security Administration, 2015).

distributed to the regions Praha and Stredocesky which reported during the analysed period the lowest unemployment rates.

Figure 2: Average Subsidy per Capita in the Czech Regions for Years 2012-2015 (in CZK)
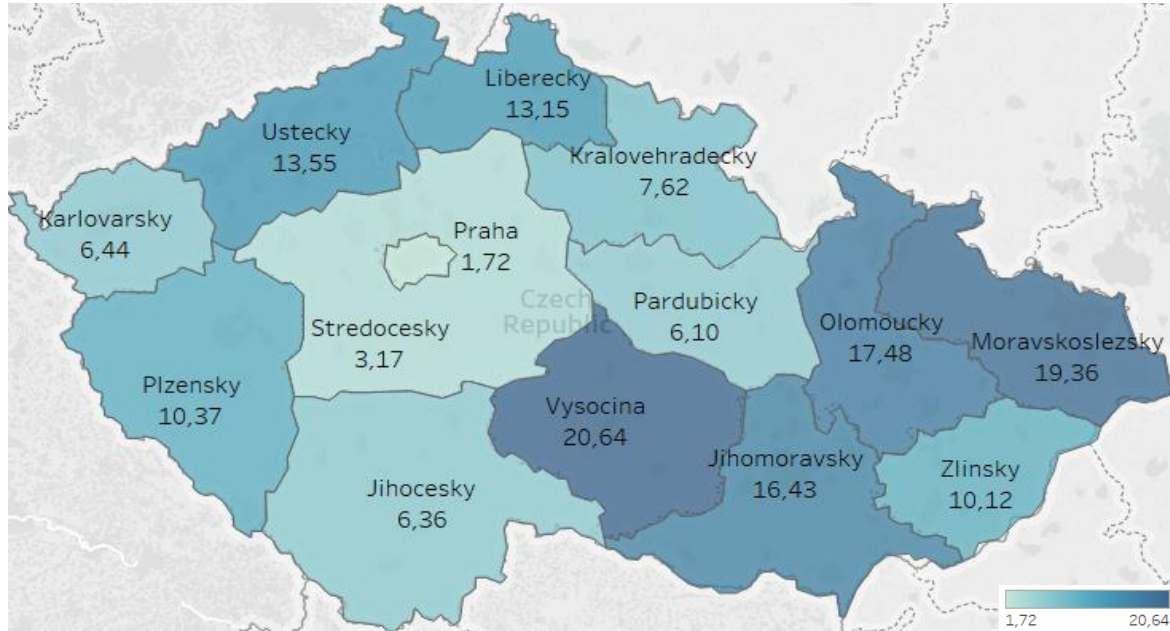
Source: Tableau, own calculations (Ministry of Labour and Social Affairs, 2016)

Based on presented numbers, it looks that the start-up subsidy is not often used as a tool of active labour market policy in the Czech Republic. To illustrate that, in 2015 there were 478.9 thousands of unemployed, but out of them only 3 212 (0.7%) were supported to become self-employed (Ministry of Labour and Social Affairs, 2015). The newly created jobs may then result even in lower unemployment rate in the region. This positive spillover is called in labour economics "a double dividend" (e. g. Caliendo and Künn, 2014 or Dvouletý and Lukeš, 2016). To evaluate the programme, I conduct regression analysis from the regional/aggregated perspective. I empirically test, whether the amount of supported individuals was associated with the lower rates of unemployment. I also further test, whether the programme influenced the regional rates of employment as additional spillover of the programme. Formally, the tested hypotheses are stated below:

H₁: There was a negative relationship between the amount of supported self-employed and unemployment rates during the period of years 2012-2015 in the Czech NUTS 3 regions.

H₂: There was a positive relationship between the amount of supported self-employed and employment rates during the period of years 2012-2015 in the Czech NUTS 3 regions.

6.4. Data

Empirical analysis is based on the panel of fourteen NUTS 3 regions for the period of years 2012-2015. Range of the dataset is limited by the availability of the main explanatory variable – amount of supported self-employed (*SUPPORTED_SELF-EMPLOYED*). This variable was obtained from the Yearbooks of the Ministry of Labour and Social Affairs (2012, 2013, 2014, 2015). The outcome variables, percentage rates of unemployment (*UNEMPLOYMENT_RATE*) and employment (*EMPLOYMENT_RATE*) were obtained from the the regional series of the Czech Statistical Office (2016c). Calmfors (1994) notes that for macroeconomic evaluation of the programme, it is important to add several control variables, to ensure reliability of the provided estimates. Given the existence of the regional disparities among the Czech regions (Baštová et al., 2011), I employ as a main control variable the real GDP per capita obtained from the Czech Statistical Office (2016c). To ensure comparability across the regions and over time, the financial amounts were adjusted from inflation to the real values via GDP deflator (taken from Eurostat, 2016a). The variable was further transformed into the form of natural logarithm as it is in econometrics common to express financial variables in the logarithms (Verbeek, 2012).

Additional control variables were also obtained from the Czech Statistical Office (2016a, 2016b, 2016c) and represent percentage share of population 15-64 years with tertiary education (*SHARE_TERTIARY_EDUCATED_POP*) and population density (*POPULATION_DENSITY*). Descriptive statistics are presented in the Table 2 below.

Table 3: Summary Statistics of the Collected Data

Variable	Mean	Maximum	Minimum	Std. Dev.	Observations
UNEMPLOYMENT_RATE	6.56	10.75	2.49	2.07	56
EMPLOYMENT_RATE	55.73	66.3	50.7	3.29	56
SUPPORTED_SELF-EMPLOYED	211.84	591	33	122.21	56
REAL_GDP_PER_CAPITA	359983.28	827274.18	262535.46	127700.57	56
*ECONOMICALLY_ACTIVE_POP_*	67.31	69.20	65.27	0.87	56
TERTIARY_EDUCATION_SHARE	13.10	27.79	8.20	4.62	56
POPULATION_DENSITY	295.08	2554.53	63.30	626.19	56

Source: STATA 14, own calculations

The following Figure 2 depicts the average unemployment rates and the average amount of supported self-employed in the Czech regions during the period of years 2012-2015. The highest unemployment rates were during the analysed period in the regions Karlovarsky, Olomoucky and Moravskoslezsky, contrary to the regions Praha, Stredocesky and Jihocesky, which reported the lowest unemployment rates. As in the line with the Figure 1, the highest amounts of supported individuals were observed on average in the regions Jihomoravsky, Moravskoslezsky and Olomoucky. The lowest amounts of subsidized individuals were during the analysed period in the regions Praha, Karlovarsky, and Zlinsky.

Figure 3: Average Unemployment Rates and the Average Amount of Supported Self-employed in the Czech Regions during the period of years 2012-2015 (unemployment rates on the top in %, amount of supported self-employed on the bottom)
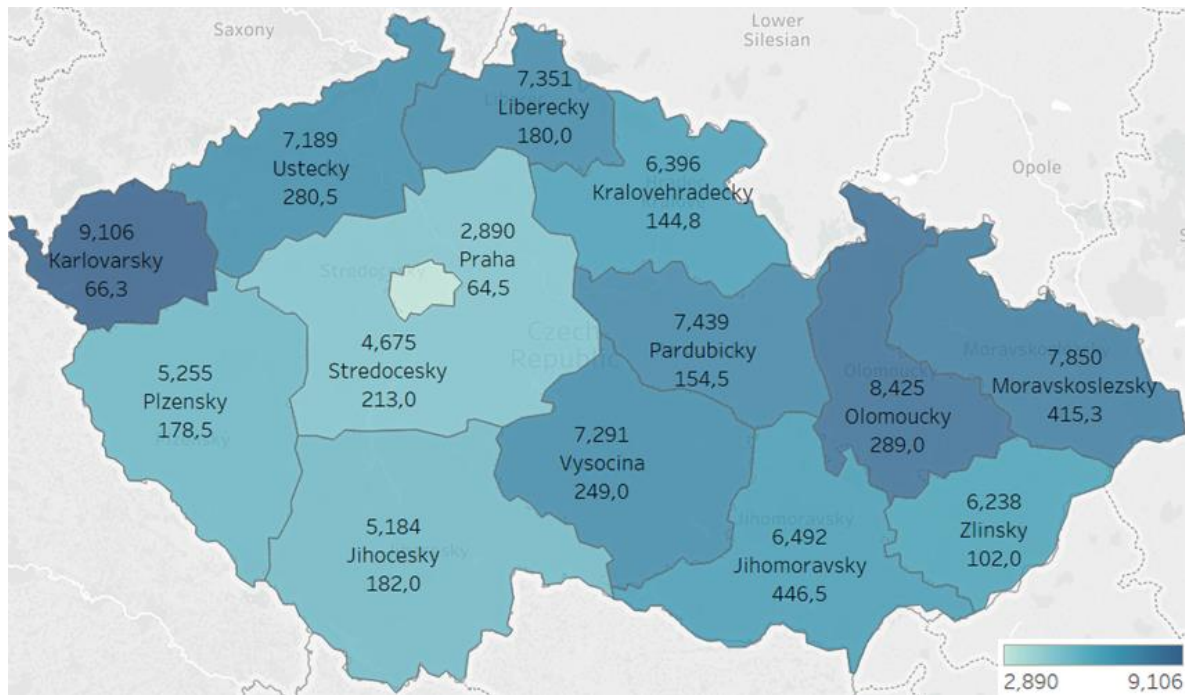
Source: Tableau, own calculations (Czech Statistical Office, 2016a, 2016c)

6.5. Results and Discussion

Econometric approach is implemented to quantify the associations among the variables and to empirically test the stated hypotheses on the data of the fourteen Czech NUTS 3 regions for the period of years 2012-2015. As a first step of the empirical analysis, all variables were tested for stationarity to make sure, that non-stationary variables do not bias the estimated coefficients. No unit root has been detected among the variables and therefore the multivariate regression models were estimated, based on the stationary variables (Baltagi, 2016). In a panel data analysis, one needs to control for an unobserved heterogeneity across the Czech regions and over the analysed period of years 2012-2015. Therefore, the standard ordinary least squares (OLS) method does not provide reliable estimates. As a common remedy, fixed or random effects estimation techniques are implemented. To decide between the fixed or random effects, the likelihood ratio test and Hausman statistics are commonly

used (Verbeek, 2012). The panel diagnostics was in favour of the fixed effects approach. Presented models in Table 3 were therefore estimated with the region fixed effects approach combined with the White robust standard errors and covariance to make sure that the results are not affected by the consequences of autocorrelation and heteroscedasticity. Variance Inflation Factors test was used to inspect the collinearity among the explanatory variables, and no multicollinearity was detected (Verbeek, 2012). All three presented regression models in Table 3 were found to be statistically significant and reported good explanatory power of the variance of the explained (dependent) variables. Obtained results are compared to the previously reported findings by empirical scholars and with the stated hypotheses.

The first two models (Model 1 and Model 2) were used to investigate the relationship between the amount of supported self-employed and unemployment rates during the period of years 2012-2015 in the Czech NUTS 3 regions. The potential effect of the programme was tested initially (in Model 1) and with up to one year lag (in Model 2). Both coefficients of the key variable representing the amount of supported self-employed were found to be negative and statistically significant. The first hypothesis (**H₁**) is therefore empirically supported. This finding is in consistency with the previously reported empirical results of Hora and Sirovátka (2012) and they are also in the line with the observations of Belás et al. (2015) and Krajčová et al. (2013) who note that the important motivation to start business in the Czech Republic is to have a job. One may also see that the regions with higher shares of tertiary educated population and higher levels of GDP per capita, reported during the analysed period lower rates of unemployment, as already found by the previous authors (e. g. Krelová and Krpálek, 2014 or Dvouletý, 2017).

To test the potential spillovers of the programme on the regional employment rate (see e. g. Caliendo and Künn, 2014 or Dvouletý and Lukeš, 2016), I have estimated Models 3 and 4. Unfortunately, the main explanatory variable representing the amount of supported self-employed in both models has not provided fully conclusive results. The initial coefficient of the variable was found to be positive and statistically significant (in Model 3). However the coefficient lagged by one year was found to be even negative (in Model 4).

Given the contradictory signs of the coefficients, the second hypothesis (**H₂**) assuming a positive relationship between the amount of supported self-employed and employment rates during the period of years 2012-2015 in the Czech NUTS 3 regions cannot be fully supported and the hypothesis requires further research attention. If there was any "double dividend" of the programme, then perhaps only in the short term. Signs of the estimated coefficients of the control variables were in the line with the existing research and in the line with economic reasoning.

Table 4: Estimated Regression Models on the collected Data for Years 2012-2015

Model	Model (1)	Model (2)	Model (3)	Model (4)
Explanatory/Dependent variable	*UNEMPLOYMENT_RATE*		*EMPLOYMENT_RATE*	
SUPPORTED_SELF-EMPLOYED	-0.00884*		0.00400*	
	(0.00413)		(0.00221)	
SUPPORTED_SELF-EMPLOYED(-1)		-0.00754**		-0.0000115
		(0.00300)		(0.00194)
LOG(REAL_GDP_PER_CAPITA)	-2.851	-7.732	2.849	4.345
	(5.641)	(7.483)	(4.341)	(5.322)
SHARE_TERTIARY_EDUCATED_POP	-0.738**	-0.543	0.740***	0.514
	(0.323)	(0.473)	(0.167)	(0.322)
POPULATION_DENSITY	0.0113	0.00539	-0.00665	-0.00154
	(0.00789)	(0.00686)	(0.00406)	(0.00449)
CONSTANT	51.13	112.2	10.80	-5.807
	(69.00)	(89.93)	(53.10)	(63.24)
Observations	56	42	56	42
R^2	0.332	0.304	0.490	0.323
Adjusted R^2	0.279	0.229	0.450	0.250
AIC	175.4	127.4	123.5	87.68
BIC	183.5	134.4	131.6	94.63

Note: Standard Errors are in parentheses; *** stat. significance on 1%, ** stat. significance on 5%, * stat. significance on 10%. Models were estimated with region fixed effects and with robust standard errors.

Source: STATA 14, own calculations

These empirical findings are not without limitations. The first limitation is the data availability. Robustness of the results will definitely increase, once more of years will be available for the analysis. Regression models will then have more observations and the reliability of obtained results will increase. The second limitation is dedicated to the level of analysis, since no individual data were available, only the aggregated approach on the NUTS 3 level could have been used. Availability of the variables on the level of individuals would not only shed more light on the outcomes of the programme, however may also help to

further understand the specificities of the subsidized businesses, their rates of survival and incomes of their owners.

6.6. *Conclusion*

Self-employment as a way out of unemployment has been questioned recently also by the researchers from the Czech Republic (e. g. Hlaváček et al., 2015; Mandysová, 2012 or Dvoulety and Mareš, 2016a). The main purpose of this study was to empirically investigate the impact of self-employment subsidy for unemployed in the Czech NUTS 3 regions for the period of years 2012-2015 to provide policy makers recent and relevant empirical evidence serving as a supportive material for policy adjustments. Regression models estimated with the fixed effects supported the negative impact of the supported self-employed on the unemployment rates in the Czech regions as described by the theory of necessity entrepreneurship. The second set of econometric models was used to test the potential spillovers of the programme on the regional employment rate. Unfortunately, no conclusive results were found and this question needs to be investigated again in the future. The presented analysis has been however conducted from the aggregated perspective, and therefore the presented results needs to be interpreted with particular caution.

Regionally are self-employment subsidies most frequently allocated to unemployed in the regions with the higher unemployment rates. Analysis of the direct costs of the programme revealed that the costs of the self-employment programme are not that high, if one takes into account alternative costs of the unemployment benefits paid to unemployed and social insurance paid back to the state by the newly established self-employed. According to Global Entrepreneurship Monitor (2013) in the Czech Republic 22% of those who were engaged in total entrepreneurial activity started their enterprise out of necessity because they had no other option to work. However only 0.7% of unemployed got during the years 2013-2014 a chance to be supported by the self-employment programme to establish their own enterprise. In the neighbouring countries is this support used as a tool of active labour market policy more frequently. During the same period was the same ratio 1% in Slovakia, 1.4% in Germany, 2.9% in Poland and the highest engagement reports Austria,

where 8.8% of unemployed were supported to start their own business (Eurostat, 2016b; 2016c)[10]. Based on these figures I humbly suggest to apply the self-employment programme in the Czech Republic more frequently, I can imagine that the ratio of supported unemployed could be in the Czech Republic increased up to 1.5%, since there is a significant ratio of people starting business out of necessity and experience from the more frequent usage of the programme in our neighbouring countries. However the exact number should be discussed by the policy makers, labour office representatives and could be further modified.

Researchers also point out, that some groups of individuals perform in self-employment programmes better. Their results can be taken as an inspiration for the Czech labour office workers having the option to encourage unemployed into self-employment. According to their results, better perform enterprises founded by individuals with higher levels of education (secondary or tertiary). Higher survival rates are also reported by males compared to females and by individuals who are more willing to accept risks. (e. g. Dvouletý and Lukeš, 2016; Caliendo and Kritikos, 2010 or Hora and Sirovátka, 2012).

Based on the previous research, the most important task for the labour office workers is to persuade unemployed to establish a business, to encourage them and to remove their fear of failure (e. g. Žambochová, 2013; Lukeš and Zouhar, 2013 or Lukeš et al., 2013). Unemployed individuals are also afraid of administrative barriers and bureaucracy. Continuous reduction of administrative barriers is therefore in the future needed (Dvouletý and Mareš, 2016a). Unemployed are also afraid to pay for their first costs, including the

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[10] Statistics reported by Eurostat (2016b; 2016c) slightly differed to those reported by the national ministries of the labour and social affairs of the above mentioned countries, however author used these number to achieve comparability across the countries, taking into account this limitation. The ratio was calculated as the number of unemployed entrants into self-employment programme and annual average of unemployed for years 2013-2014 (Eurostat categories: *Participants by LMP intervention* and *Unemployment by sex and age - annual average)*.

social and health insurance which needs to be paid from the first month after they officially register their new business activity. One way to encourage the rates of newly established self-employed could be to postpone payments for social and health insurance during the first month and to give to formerly unemployed time to earn their first revenues (Krajčová et al., 2013).

Future research should challenge the effectiveness of the start-up subsidy programmes in the Czech Republic on the individual level. Such an empirical analysis could provide information about the survival rates of subsidized businesses, but also about the incomes of their formerly unemployed owners. Establishment of the strong cooperation between the research community and public authorities is therefore required. Such a cooperation could lead to a construction of the follow-up survey for formerly unemployed individuals, which could deliver requested data about the income, job satisfaction and their employment status. Collected data would allow implementation of the counterfactual analysis, which could answer the questions related to the impact of the self-employment programme on the different social groups and that could help to address the most benefiting groups from the programme.

6.7. References

Acs, Z., Åstebro, T., Audretsch, D., & Robinson, D. T. (2016). Public policy to promote entrepreneurship: a call to arms. *Small Business Economics*, *47*(1), 35-51.

Adámek, P., & Dobrylovský, J. (2012). The Evolution in the EU Strategy of Active Policy Employment – the Czech Republic Case. *6th International Days of Statistics and Economics*, 1-10.

Audretsch, D. B., Dohse, D., & Niebuhr, A. (2015). Regional unemployment structure and new firm formation. *Papers in Regional Science*, *94*(S1), S115-S138.

Baltagi, B. (2016). *Econometric analysis of panel data*, 5th ed.: John Wiley & Sons, 373 p., ISBN 978-1-118-67232-7.

Baštová, M., Hubáčková, V., & Frantál, B. (2011). Interregional differences in the Czech Republic, 2000-2008. *Moravian Geographical Reports*, 19(1), 2-16.

Belás, J., Demjan, V., Habánik, J., Hudáková, M., & Sipko, J. (2015). The business environment of small and medium-sized enterprises in selected regions of the Czech Republic and Slovakia. *E+ M Ekonomie a Management*, (1), 95-110.

Bosma, N., & Harding, R. (2006). *Global Entrepreneurship Monitor: GEM 2006 summary results*. Babson Park/London: Babson College/London Business School.

Calmfors, L. (1994). *Active labour market policy and unemployment: A framework for the analysis of crucial design features*. Organisation for Economic Co-operation and Development (OECD).

Caliendo, M., & Kritikos, A.S. (2010). Start-ups by the unemployed: Characteristics, survival and direct employment effects, *Small Business Economics*, *35*(1), 71–92.

Caliendo, M., & Künn, S. (2014). Regional effect heterogeneity of start-up subsidies for the unemployed. *Regional Studies*, *48*(6), 1108-1134.

Caliendo, M., & Schmidl, R. (2016). Youth unemployment and active labor market policies in Europe, *IZA Journal of Labor Policy*, *5*(1).

Cueto, B., Mayor, M., & Suárez, P. (2015). Entrepreneurship and unemployment in Spain: a regional analysis. *Applied Economics Letters*, 22(15), 1230-1235.

Czech Employment Law/Zákon o Zaměstnanosti, 435/2004 Sb. (2004). *Společensky účelná pracovní místa § 113*, Accessed on 17th October 2016. www: < https://portal.mpsv.cz/sz/obecne/prav_predpisy/akt_zneni/ZOZ_PLATNE_ZNENI_OD_1.9.2016.PDF. >.

Czech Statistical Office, CZSO (2016a). Labour market series. Available from www: < https://www.czso.cz/csu/czso/trh-prace-v-cr-casove-rady-1993-az-2014>. Accessed on 5 August 2016.

Czech Statistical Office, CZSO (2016b). Tertiary educated population. Available from www: < https://www.czso.cz/csu/czso/101r-k-vek-a-vzdelani-populace--xxoaap0qf4>. Accessed on 5 August 2016.

Czech Statistical Office, CZSO (2016c). Regional time series. Available from www: < https://www.czso.cz/csu/czso/regionalni_casove_rady>. Accessed on 5 August 2016.

Czech Social Security Administration (2015). Payments for Social Insurance. Available from www: < http://www.cssz.cz/cz/pojisteni-osvc/platba-pojistneho/zmeny-v-pojisteni-osob-samostatne-vydelecne-cinnych-od-1-1-2016.htm >. Accessed on 5 August 2016.

Cueto, B., Mayor, M., & Suárez, P. (2015). Entrepreneurship and unemployment in Spain: a regional analysis. *Applied Economics Letters*, 22(15), 1230-1235.

Dvouletý, O. (2017). Can Policy Makers Count with Positive Impact of Entrepreneurship on economic Development of the Czech Regions? *Journal of Entrepreneurship in Emerging Economies*, 9(3) (in print)

Dvouletý, O., & Lukeš, M. (2016). Review of Empirical Studies on Self-Employment out of Unemployment: Do Self-Employment Policies Make a Positive Impact? *International Review of Entrepreneurship*, 14(3), 361-376.

Dvouletý, O., & Mareš, J. (2016a). Determinants of regional entrepreneurial activity in the Czech Republic. *Economic Studies & Analyses/Acta VSFS*, 10(1), 31-46.

Dvouletý, O., & Mareš, J. (2016b). Relationship between unemployment and entrepreneurial activity: Evidence found among Visegrad countries. *Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS 2016)*, 146-156.

Dvouletý, O., & Mareš, J. (2016c). Entrepreneurial activity in the Czech regions: Are business companies and self-employed individuals affected by the same factors? *10th International Days of Statistics and Economics*, 418-428.

Eurostat (2016a). Price index (implicit deflator), 2010=100, national currency. Available from www: < http://ec.europa.eu/eurostat/data/database >. Accessed on 5 August 2016.

Eurostat (2016b). Participants by LMP intervention. Available from www: < http://ec.europa.eu/eurostat/data/database >. Accessed on 5 August 2016.

Eurostat (2016c). Unemployment by sex and age - annual average. Available from www: < http://ec.europa.eu/eurostat/data/database >. Accessed on 5 August 2016.

Flek, V., & Večerník, J. (2005). The Labour Market in the CR: Trends, Policies and Attitudes. *Finance a úvěr – Czech Journal of Economics and Finance*, 55(1-2), 5-24.

Fritsch, M., Kritikos, A., & Pijnenburg, K. (2015). Business cycles, unemployment and entrepreneurial entry - evidence from Germany. *International Entrepreneurship and Management Journal*, 11(2), 267-286.

Global Entrepreneurship Monitor (2013). Necessity-Driven Entrepreneurial Activity: Relative Prevalance, the Czech Republic. Available from www: < http://www.gemconsortium.org/data/key-indicators >. Accessed on 5 August 2016.

Hejzlarová, E. M. (2014). „Neviditelní "aktéři v policy analysis. *Sociálni Studia/Social Studies*, *11*(1), 109-129.

Hlaváček, P., Žambochová, M., & Sivíček, T. (2015). The Influence of the Institutions on Entrepreneurship Development: Public Support and Perception of Entrepreneurship Development in the Czech Republic. *Amfiteatru Economic*, *17*(38), 408.

Hora, O., & Sirovátka, T. (2012). *Srovnání efektů aktivní politiky zaměstnanosti v České republice v období růstu (2007) a během první fáze krize (2009)*. VÚPSV.

Chládková, H. (2010). Specifika malých a středních podniků v ČR a EU. *Acta Univ. Agric. et Silvic. Mendel. Brun*, *58*(6), 161-170.

Jirásková, E. (2013). Trendy v řízení lidských zdrojů. *Trendy v podnikání – vědecký časopis Fakulty ekonomické ZČU v Plzni,* 2013(1), 49-54.

Klapper, L., Love, I., & Randall, D. (2015). New firm registration and the business cycle. *International Entrepreneurship and Management Journal*, 11(2), 287-306.

Krajčová, J., Šebestíková, V., Křelinová, V., Vanduchová, P. & Beran, P. (2013). Možnosti Vlivu Daňové a Dotační Politiky Státu na Snížení Nezaměstnanosti v České republice. *Acta Academica Karviniensia*, 2013(1), 83-100.

Krebs, V. (2010). *Sociální politika*. Wolters Kluwer Česká republika.

Krelová, K. K., & Krpálek, P. (2014).   Possibilities to Support Entrepreneurship in the Czech   Republic   and   Slovakia. *Universal   Journal   of   Industrial   and   Business Management*, *2*(8), 210-218.

Lukeš, M., Zouhar, J., Jakl, M., & Očko, P. (2013). Faktory ovlivňující vstup do podnikání: začínající podnikatelé v České republice. *Politická ekonomie*, *61*(2), 229-247.

Lukeš, M., Zouhar, J. (2013). No Experience? No Problem – It's all about yourself: Factors Influencing Nascent Entrepreneurship Outcomes. *Ekonomický časopis*, 61(9), 934–950.

Lukeš, M., Jakl, M., & Zouhar, J. (2014). Global Entrepreneurship Monitor 2013 for the Czech   Republic.   *Podnikatelská   aktivita   v   České   republice*.   Available   at: http://www.mpo.cz/dokument149362.html.

Mandysová, I. (2012). Creating a context as the base for entrepreneurial support policy. *Scientific Papers of the University of Pardubice. Series D, Faculty of Economics & Administration*, *18*(24).

Menčlová, B. (2014). Economic Development and Number of Business Entities. *Český Finanční a účetní časopis*, 2014(4), 166-174.

Ministry of Labour and Social Affairs (2012). *Statistická ročenka trhu práce v České republice 2012*. Available from www: < https://portal.mpsv.cz/sz/stat/stro/statisticka_rocenka_trhu_prace_v_cr_v_roce_2012.pdf >. Accessed on 5 August 2016.

Ministry of Labour and Social Affairs (2013). *Statistická ročenka trhu práce v České republice 2013*. Available from www: < http://www.mpsv.cz/files/clanky/17702/rocenka_2013_v2.pdf >. Accessed on 5 August 2016.

Ministry of Labour and Social Affairs (2014). *Statistická ročenka trhu práce v České republice 2014*. Available from www: < https://portal.mpsv.cz/sz/stat/stro/mpsv_rocenka_2014.pdf >. Accessed on 5 August 2016.

Ministry of Labour and Social Affairs (2015). *Statistická ročenka trhu práce v České republice 2015*, Accessed on 5 August 2016. www: < https://portal.mpsv.cz/sz/stat/stro/rocenka2015.pdf. >.

Ministry of Labour and Social Affairs (2016a). *Společensky účelná pracovní místa*, Accessed on 17th October 2016. www: < https://portal.mpsv.cz/upcr/kp/jhm/apz. >.

Parker, S. (2009). *The economics of entrepreneurship*. Cambridge: Cambridge University Press.

Pavlíček, T. (2014). The Development of the Self-employed Sector in the Czech Republic in the Years 2006-2010. *Economic Studies & Analyses/Acta VSFS*, *8*(1).

Petrescu, M. (2016). Self-Employed Individuals with and without Employees: Individual, Social and Economic Level Differences. *International Review of Entrepreneurship*, *14*(3).

Polok, D., Michalski, P., Szewczyk, D., Keil, D., Wieczore, S., Kaciakova, P., Incze, Z., Rycerz, J., Nisztuk, T., Dvouletý, O., & Krzemiński, P. (2016). *Future of the Visegrad Group*.
Accessed on 17th October 2016. www: < http://paga.org.pl/projekty/raport-future-of-the-visegrad-group/future-of-the-visegrad-group/report?lang=en >.

Průša, L., Baštýř, I., Brachtl, M., & Vlach, J. (2009). The socio-economic status of self-employed persons in Czech society. *Research Institute for Labour and Social Affairs, Prague*.

Reynolds, P., Bosma, N., Autio, E., Hunt, S., De Bono, N., Servais, A., Lopez-Garcia, P., Chin, N. (2005). Global Entrepreneurship Monitor: Data Collection Design and Implementation 1998–2003, *Small Business Economics*, 24(3), pp. 205–231.

Román, C., Congregado, E., & Millán, J. M. (2013). Start-up incentives: entrepreneurship policy or active labour market programme? *Journal of Business Venturing*, 28, 151–175.

Soukup, T. (2011). Profiling-Predicting Long-Term Unemployment at the Individual Level. *Central European Journal of Public Policy*, *5*(1), 118-142.

Večerník, J. (2011). Self-employment in the Czech Republic and CEE countries: persons and households. *Post-Communist Economies*, *23*(3), 359-376.

Verbeek, M. (2012). *A guide to modern econometrics*. John Wiley & Sons.

Veselý, A., Nekola, M., & Hejzlarová, E. M. (2016). *Policy Analysis in the Czech Republic.* Policy Press, Bristol.

Welter, F., & Smallbone, D. (Eds.). (2011). *Handbook of research on entrepreneurship policies in central and eastern Europe*. Edward Elgar Publishing.

Wolff, J., Nivorozhkin, A., & Bernhard, S. (2016). You can go your own way! The long-term

effectiveness of a self-employment programme for welfare recipients in Germany, *International Journal of Social Welfare*, 25(2), 136–148.

Zouhar, J. Lukeš, M., Hörisch, F., Tosun, J. & Shore J. (2015). *The Impact of Labour Market Policy on Entrepreneurial Activities. CUPESSE Policy Brief No. 2.* 2015.

Zouhar, J, & Lukeš, M. (2015). Factors influencing nascent entrepreneurship of the unemployed: The role of labor market policies, *Academy of Management Proceedings, 2015*(1), 18476.

Žambochová, M. (2013). A statistical analysis of the support for small business as a solution for unemployment in the region Ústí nad Labem. In *Liberec Economic Forum 2013: Proceedings of the 11th International Conference*.

7. Effects of Soft Loans and Credit Guarantees on the Performance of the Supported Companies: Evidence from the Czech Public Programme START[11]

Abstract

Purpose - The purpose of this article was to conduct an empirical evaluation of the Czech public programme START, funded from the European Regional Development Fund. The programme lasted from 2007-2011 and supported new entrepreneurs through the zero interest soft loans and credit guarantees.

Design/methodology/approach - The counterfactual analysis (using three matching techniques: propensity score, nearest neighbour and kernel) was conducted on the firm level and investigated the changes in the financial performance (net profits, return on assets (ROA), return on equity (ROE), sales, assets turnover and debt ratio) of the supported firms four years after the intervention.

Findings - Obtained findings could not support the hypothesis assuming a positive impact of the programme on the firm´s performance. On the contrary, supported companies reported on average lower sales and lower return on assets, compared to the control group. The remaining variables could not prove any statistically significant impact of the programme. Indicators measuring a firm´s profitability (net profit, return on assets and return on equity) suggested a negative influence of the programme and the variable representing debt ratio further indicated that firms supported by the programme reported on average higher debt ratio in comparison with the control group.

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[11] Dvouletý, O. What is the Impact of the Soft Loans and Credit Guarantees on the Performance of the Supported Entrepreneurs? Evaluation of the Czech Public Programme START

Practical implications - Several policy implications are mentioned, highlighting the need to increase due diligence of the project proposals and inclusion of the reporting duty on the supported firms, especially for freelancers and self-employed individuals.

Originality/value - The empirical analysis was conducted based on the perceived research gap in the studies related to the evaluations of the entrepreneurship policies in the Central and Eastern European emerging countries.

Keywords - Entrepreneurship Policy Evaluation, Public Start-up Programme, Soft Loans, Credit Guarantees, Counterfactual Analysis, the Czech Republic

JEL codes - L53, L26, L38

7.1. Introduction

The idea of supporting entrepreneurial activity through the system of public policies originated in the scientific empirical evidence, indicating a positive influence of entrepreneurship on economic growth and job creation (e. g. Grimm and Paffhausen, 2015; Dvouletý, 2017a; 2017b; Van Stel and Storey, 2004; Shane, 2007; Craig et al., 2007 or Van Praag and Versloot, 2007). Policy makers mainly turn their attention towards the support of small and medium sized enterprises (SMEs), which are considered as those, bearing innovation and increasing regional competitiveness, through the various entrepreneurship policies and public interventions (e. g. Perglova and Angulo-Ruiz, 2014; Millán et al., 2014, Lukeš, 2013 or Thurik, 2009). To better understand entrepreneurship policies, one can recall a definition by Stevenson and Lundström (2001) who explain entrepreneurship policies as "policy measures taken to stimulate entrepreneurship that are aimed at the pre-start, the start-up and post-start-up phases of the entrepreneurial process" (Stevenson and Lundström, 2001, p. 23). Policy makers often use a variety of tools to stimulate entrepreneurial activity such as soft loans, credit guarantees, payable and non-repayable capital grants, investment incentives, tax deductions and different forms of entrepreneurial education and trainings to achieve higher economic growth and increased employment (e. g. Dvouletý and Lukeš, 2016; Bosma et al., 2016; Perglova and Angulo-Ruiz, 2014). Foreman-Peck (2013) and

others (e. g. Kim et al., 2015; Biagi et al., 2015; Antonioli et al., 2014 or Sternberg, 2014) report positive effects of the participation in the governmental programmes boosting entrepreneurship on the firm level. However, outcomes of entrepreneurship policies do not have to be always as positive, as they would be expected by the policy makers. There are researchers (e. g. Åstebro, 2016; Mason and Brown, 2013 or Shane, 2009) who point out that the usage of public policies promoting entrepreneurship should be reduced, since impacts of policies may be ambiguous and even could have zero impact on the supported individuals and companies. To shed more light onto this issue, one needs to dive into the empirical field and investigate the outcomes of concrete programs and policies (e. g. Acs et al., 2016). Recently published reviews of empirical literature by Grimm and Paffhausen (2015) and by Cho and Honorati (2014) show that it is important to establish access to capital for the new entrepreneurs, nevertheless the authors also point out that the entrepreneurial education and business training programmes have larger positive impacts on supported entrepreneurs compared to the capital grants and other policies. Both studies also indicate that entrepreneurship policies have more significant impacts when it comes to the support of founding enterprises/new start-ups than in expanding of employment of already established companies. Their main conclusion is that there is an overall lack of empirical studies conducted on the firm level and especially those which aim to assess the long-term impacts of the governmental programmes.

One way to allocate the financial capital towards the new entrepreneurs and to help them with the establishment of their own business, is through the system of soft loans and credit guarantees provided by the public sector. The reasoning behind this form of public support, which has become an interest in this article, is to facilitate an access to the financial capital and to remove the financial barriers of high interest rates, collateral requests and other disadvantageous conditions offered by the regular market based financial institutions. Compared to the capital grants and to other non-repayable forms of support, in the case of soft loans and credit guarantees, all resources allocated by the state do not have to necessarily imply a negative cash flow for the state, because not all supported individuals result in bankruptcy. For the supported SMEs is gained capital a chance to growth, to offer new jobs

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and to expand their business activities. Accordingly, their support may lead to an increased economic growth and reduction of unemployment (e. g. Gaia et al., 2016; Perglova and Angulo-Ruiz, 2014; Bondonio and Greenbaum, 2014; Biagi et al., 2015 or Arping et al., 2010).

Evaluations of the financial forms of entrepreneurship support in Europe on the firm level were in the past years mostly investigated by the scholars from the Southern European countries, such as Italy or Spain (e. g. Gaia et al., 2016; Biagi et al., 2015, Asdrubali and Signore, 2015, Bondonio and Greenbaum, 2014 or Garcia-Tabuenca and Crespo-Espert, 2010). However, the empirical evidence investigating the outcomes of the soft loans and credit guarantees and generally questioning the outcomes of entrepreneurship policies in the Central and especially Eastern European countries have not deserved much research attention so far (e. g. Polok et al., 2016; Dvouletý, 2017d; Dvouletý and Mareš, 2016a; 2016b, Welter and Smallbone, 2011 or Klonowski, 2006). This increasing research gap attracts researchers, who strive to form policy recommendations based on the empirical evidence, and those who are willing to be trained as evaluators, since a lot of programmes need to be assessed.

Most of the recent studies in the Central and Eastern European region have been focused on the evaluation of cohesion R&D policies and those aimed at the elimination of the regional disparities (e. g. Mateut, 2017, Čadil et al., 2017, Stonkute and Vveinhardt, 2017, Blažková, 2016; Mirošník et al., 2016, Srholec and Žížalová, 2014, Potluka et al., 2013 or Hartsenko and Sauga, 2013), policies facilitating trainings and education (Potluka et al., 2016 or Kopečná, 2016) and effectivity of the self-employment programmes for the unemployed (Dvouletý, 2017c or Hora and Suchanec, 2014). However based on a search in the databases of previously published academic articles and research reports, no study has been focused on the evaluation of entrepreneurship support through the financial instruments yet. Therefore the main aim of this study is to contribute to the regional knowledge, by the assessment of the outcomes of the Czech public programme START, funded from the European Regional Development Fund (European Commission, 2016a), which was

providing credit guarantees and soft loans to the newly established entrepreneurs during the period of years 2007-2011 in the Czech Republic (Ministry of Industry and Trade, 2016a). The empirical analysis is conducted on the firm level (from micro econometric perspective) and it investigates the changes in the financial performance of the supported firms based on the application of the counterfactual impact analysis (quantitative approach).

The article is structured as follows, in the first part (1), findings of the previously published empirical studies are presented. In the second part (2) of the article, the programme START is described and analysed from the economic perspective and the regional allocation of the financial resources is depicted. The third section (3) describes the collected dataset of firms and analysed outcome variables (net profits, return on assets (ROA), return on equity (ROE), assets turnover and debt ratio). In the fourth part (4), micro econometric analysis of the data, employing framework of counterfactual analysis is conducted, and obtained results are discussed with respect to the previous empirical findings. The last part of the article is focussed on the policy recommendations and it provides suggestions for future research.

7.2. *Review of Empirical Studies*

This section presents the findings of the past studies focused on the analysis of the outcomes of the public policies facilitating financial instruments on the firm level. The methodology of the previous scholars is mostly quantitative and it is based on the implementation of the econometric methods. Maggioni et al. (1999) analysed the outcomes of the Italian programme supporting new ventures through loans with reduced interest rates. They were unable to prove any significant influence of the programme on the sales, their growth, or on the amount of employees. Honjo and Harada (2006) investigated the impact of the Japanese Creative Business Promotion Law (CBPL) on the growth of sales, assets and employment of the supported businesses. Their results confirm a positive influence of the programme on the growth of assets. Kang and Heshmati (2008) studied the effects of the credit guarantee policy in Korea on the productivity, sales and employees of the supported enterprises. They found no impact of the policy on the employment, however positive influence was observed for the variables measuring firm performance (productivity and sales). Zecchini and Ventura

(2009) investigated the effects of the Italian credit guarantees scheme on the assets, sales, number of employees and debt-ratio of the supported enterprises. Obtained empirical results confirm positive influence of the scheme on sales and assets of the supported companies. However no influence was found on the amount of employees. Furthermore, the authors of the study observed higher debt ratio for the supported firms in comparison with the control group. Oh et al. (2009) analysed the outcomes of the Korean programme facilitating credit guarantees. Investigated variables accounted for survival rates, growth rates of productivity, employment, sales, R&D status and investment intensity. The authors conclude that the programme positively influenced a firm´s survival rate but no effect was observed for R&D activity and productivity. Kösters (2010) studied the effects of the Eastern German programme supporting firms with soft loans and credit guarantees. She finds no statistically significant impact of the programme on the survival rates and growth in employment of the supported companies. On the contrary, Garcia-Tabuenca and Crespo-Espert (2010), found a positive influence of the Spanish programme facilitating financial instruments on the productivity, sales, value added and profitability of the supported firms. Gubert and Roubaud (2011) investigated the outcomes of the micro-finance loan schemes in Madagascar. They conclude that the programme had a positive influence on the turnover, productivity, value added, profit and number of employees of the supported enterprises. One of the more recent studies was conducted by Cowling and Siepel (2013) who analysed the outcomes of the Loan Guarantee Scheme (SFLG) in the United Kingdom. They report positive effects of the programme on the sales, exports and job creation of the supported enterprises.

Based on the presented outcomes of the previously published studies, it is very difficult to derive any conclusions regarding the outcomes of the programmes facilitating financial instruments. Public schemes could have both positive and negative effects on the firm´s profitability, performance and amount of employees. Previous studies serve as an inspiration for the analysed outcome variables and empirical approach towards the programme evaluation. The presented study contributes to this research debate by the assessment of the Czech public programme START which is described in the following section.

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7.3. Public Programme START

The programme START took place in the Czech Republic in the two subsequent calls, during the period of years 2007-2011. As requested for the EU public support, the programme was following the principle *de minimis*. The programme was a part of the Operational Programme Enterprises and Innovation (OPEI) funded from the European Regional and Development Fund (ERDF) during the EU programming period of years 2007-2013 (European Commission, 2016a; 2016b). The main organizing institutions, which were responsible for the programme, were the Czech-Moravian Guarantee and Development Bank (2016) and the Ministry of Industry and Trade (2016a). The programme START intended to support completely new entrepreneurs, or those who were starting a business activity seven years after they ended their previous one. The programme´s objective was to increase competitiveness of the Czech Republic. The idea behind the programme was to facilitate access to financial capital for new business ideas through the system of zero interest soft loans and credit guarantees. Applicants had to meet several criteria to obtain public support. Business activity of applicants could not be focused on the sector of agriculture and they could not have any liabilities against the Czech public authorities. Entrepreneurs aiming to start a business in the Capital Prague were also excluded from the application process. Applications were assessed by external evaluators, who made decisions about the acceptance of the business proposals and all the requests were executed by the Czech-Moravian Guarantee and Development Bank (Ministry of Industry and Trade, 2016a; 2016b).

Applicants could choose between the two forms of support from the programme START. The first one offered them a zero interest soft loan covering up to 90% of the project costs, up to 0.75 mil. CZK in the case of solo entrepreneur, or up to 1.5 mil. CZK in the case of entrepreneurial team. The maximum possible maturity was set up to be seven years. The second scheme offered applicants a credit guarantee covering up to 80% of the loan. The maximum amount of the loan was 1.5 mil. CZK and the maturity had to be longer than three years. Recipient of the guarantee had to pay 0.1% p. a. of the guarantee for the service, however at the same time he/she received a public support worth 3% of the guarantee. If the

guarantee was not applied, the project was implemented successfully within two years, and the supported entrepreneur(s) was/were repaying the loan, then the recipient received an extra bonus making 15% of the loan (Ministry of Industry and Trade, 2016a; 2016b).

The total amount of funds allocated to the projects from public resources was 79.7 mil. CZK; however, the projects got financial capital worth 170.3 mil. CZK in total, since the loans and guarantees were organized within the partnerships with other market based financial institutions. 88 projects were supported by the credit guarantees and 100 projects got zero interest soft loans. The highest share of the projects was supported in 2008 and the last projects were supported in 2010. The majority of the supported were self-employed/freelances (107) and the rest of them represented a business company. From the projects supported by the credit guarantees, the most frequent project was the construction of the photovoltaic power plants and out of the projects supported by the zero interest soft loans, it was the foundation of a store. When it comes to the number of employees, the majority of the supported businessmen (112) reported that they have fewer than five employees. Regional allocation of the projects across the Czech NUTS 3 regions is depicted in Figure 1. The highest amounts of public resources have been allocated to the regions Ústecký, Pardubický and Středočeský. On average, each of the projects received 0.9 mil. CZK, out of which 0.4 mil. CZK was obtained from public funds (Ministry of Industry and Trade; 2016b).

Figure 4: Allocation of the Resources from the Program START across the Czech NUTS 3 regions in CZK

(Legend from the top: number of projects, name of the region, public support, total amount of resources allocated)
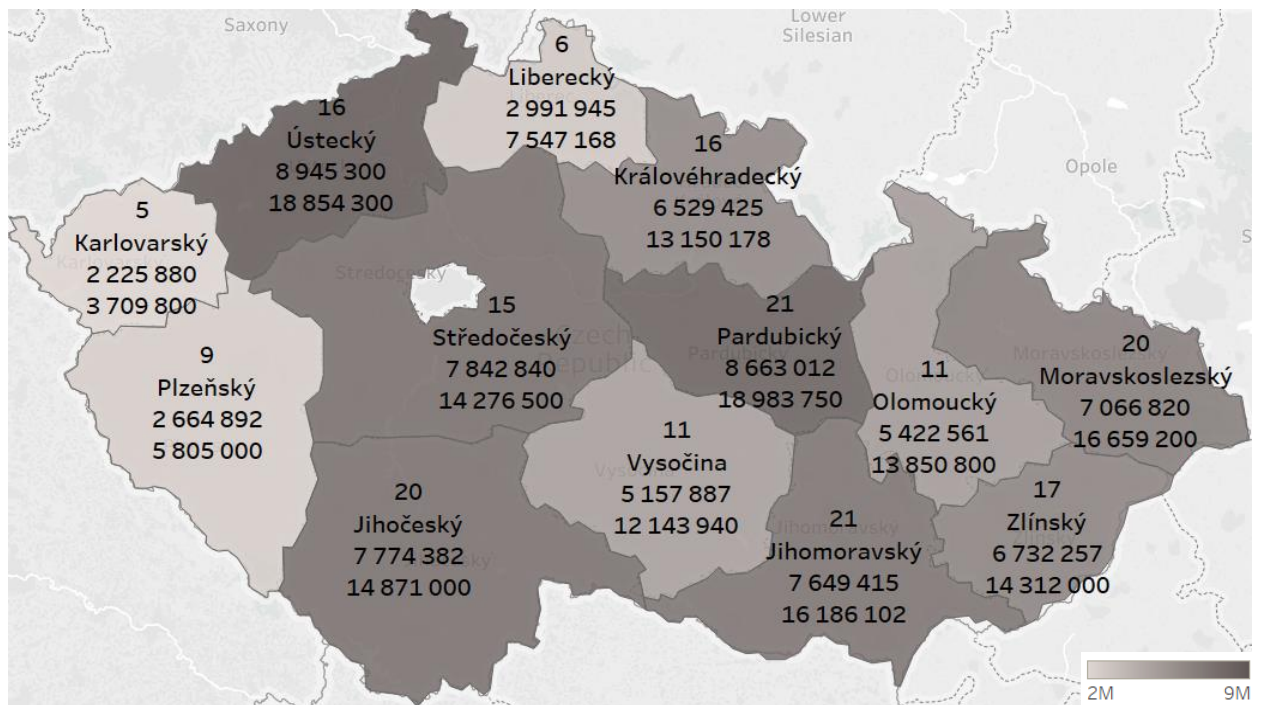
Source: Tableau, own calculations (**Ministry of Industry and Trade, 2016b**)

To see whether this remarkable allocation of financial capital had any impact on the financial performance of the supported enterprises, I ran the following counterfactual analysis, applying the methodology of previous scholars (e. g. Biagi et al., 2015; Kim et al., 2015; Bondonio and Greenbaum, 2014 or Kösters, 2010) assuming a quasi experimental research framework. The following key performance indicators were selected based on the previously published studies and based on the data availability. My research hypothesis is formally stated as follows:

H₁: Firms participated in the programme START reported better financial performance in terms of higher profits, higher return on assets (ROA), higher return on equity (ROE), higher sales, higher assets turnover and lower debt ratio, in comparison with the control group.

7.4. Data

Empirical analysis is based on the firm level data, covering the period of years 2006-2014. Based on the list of supported projects (Ministry of Industry and Trade, 2016b), 188 supported companies were identified. As a second step, the database Albertina (Bisnode, 2016) was used to collect the data. To ensure that the selection of companies in the control group would not affect the results, a control group of 18,499 firms was selected randomly from the population of active enterprises and their data were collected from the database. Collected variables are depicted in the Table 1. After the data collection, the descriptive statistics have been inspected and several adjustments have been made. Removed were all entities, which are not considered as business units (e. g. schools, foundations or associations). To make sure that extreme values (outliers) would not affect the results, the main financial outcome variables of the control group (return on assets, assets turnover and debt ratio) have been restricted by the interval (-400; 400). This aimed to achieve that "value leaders and losers" were excluded from the sample as suggested by the previous researchers (e. g. Hawawini et al., 2003). Unfortunately, the dataset suffers from an extreme amount of missing values. No data could be obtained for the self-employed/freelancers (107) participating in the programme, which do not have any obligation to report their financial records. Out of the 81 remaining business companies, I was able to collect data for 57 firms, having in total data for 30% of all supported enterprises and for 70% of the supported business companies. Therefore I am able to evaluate the programme only with respect to the supported business companies. Control sample finally consisted out of 10,681 firms, having complete data.

Table 5: List of Variables

Variable	Definition
Treated	Dummy variable indicating, whether the particular firm participated in the program START (188 participating enterprises).
Net Profit	Outcome variable, calculated as an average of net profits of the firm during the years 2011-2014.
Return on Assets (ROA)	Outcome variable, calculated as an average percentage share of net profits of the firm and its assets during the years 2011-2014.
Return on Equity (ROE)	Outcome variable, calculated as an average percentage share of net profits of the firm and its own capital during the years 2011-2014.
Sales	Outcome variable, calculated as an average sales for own products and services during the years 2011-2014.
Assets Turnover	Outcome variable, calculated as an average ratio of sales/turnover and assets during the years 2011-2014.
Debt Ratio	Outcome variable, calculated as an average percentage share of liabilities of the firm and its assets during the years 2011-2014.
Year of Registration	Control variable, referring to a year when the company was officially established.
Company Size	Control variable, dividing firms into the four dummy categories, according to the amount of employees reported: Micro (less than 10 employees), Small (10-49 employees), Medium (50-249 employees) and Large (more than 250 employees).
Sector	Control variable, dividing firms into the 21 NACE dummy categories according to their business activity.
Region	Control variable, dividing firms into the 14 NUTS3 dummy categories according to the Czech region, where they operate.

Source: Bisnode (2016) and Ministry of Industry and Trade (2016b), own elaboration

7.5. *Empirical Results and Discussion*

I apply a quasi-experimental approach and perform a counterfactual analysis based on the established research methodology. The main advantage of this approach is that the estimated effect of the participation in the programme START (Average Treatment Effect on the Treated – ATET) is quantified after the application of the matching procedures (kernel matching, propensity score matching and nearest neighbour matching). Matching procedures are implemented to connect with each of the supported firm (Treated) a partner non-supported firm (Control) with the most possible similar characteristics based on the estimated propensity score. The propensity score is quantified based on the results of the logistic regression estimating the probability of the participation in the programme. Each

pair is then matched based on the characteristics before the programme started and the average treatment effect on the treated is quantified after the programme ended, as a difference between the Treated firms and the Control group (e. g. Dehejia and Wahba, 1999; Becker and Ichino, 2002; Abadie et al., 2004; Caliendo and Kopeining, 2008 or Bondonio, 2009).

My empirical approach begins with the estimation of the logistic regression needed for a calculation of the propensity score, then the different matching procedures are applied and finally the results are interpreted in the line of existing research (Angrist and Pischke, 2008). All calculations were made in the software STATA 14. Estimated logistic regression is presented in Table 2. The dependent (outcome) variable in the model was the probability of the participation (*Treated*) in the programme START, and as explanatory variables (covariates) were used *Year of Registration*, *Company Size, Sector* and *Region* applied commonly in the previous empirical studies (e. g. Pergelova and Angulo-Ruiz, 2014). The model fit is quite good, the Pseudo R-Squared informs us that the model was able to explain 36% of the variability of the dependent variable. Despite that all coefficients were not found to be statistically significant, the covariates are kept in the model in order to calculate the most appropriate propensity score (Angrist and Pischke, 2008). The model supported the previously presented descriptive evidence. Likelihood of the participation in the programme START is higher for younger companies, enterprises doing business in Pardubický region, and when it comes to a sector, higher probability was observed for firms in services, manufacturing or motor vehicles sectors.

Table 6: Robust Logistic Regression Used for Calculation of the Propensity Score

Variable	Coefficient	Std. Error	P>z
Year of Registration	0.18***	0.01	0.00
Region Praha	(omitted)		
Region Jihomoravský	-1.03***	0.39	0.01
Region Jihočeský	0.28	0.41	0.48
Region Karlovarský	-0.25	0.69	0.71
Region Královéhradecký	-0.18	0.41	0.66
Region Liberecký	-0.30	0.59	0.71

Region Moravskoslezský	-0.60	0.40	0.14
Region Olomoucký	0.09	0.44	0.84
Region Pardubický	0.74*	0.40	0.07
Region Plzeňský	-0.34	0.49	0.49
Region Středočeský	0.24	0.41	0.56
Region Vysočina	0.15	0.48	0.75
Region Zlínský	0.53	0.41	0.20
Region Ústecký	(omitted)		
Micro	-2.34***	0.24	0.00
Small	-5.14***	0.38	0.00
Medium	(omitted)		
Large	(omitted)		
Administrative and Support Service Activities	-0.77	0.95	0.41
Transportation and Storage	-0.66	0.76	0.39
Information and Communication	0.06	0.73	0.94
Arts, Entertainment and Recreation	(omitted)		
Other Service Activities	1.81***	0.58	0.00
Financial and Insurance Activities	0.57	0.97	0.56
Professional, Scientific and Technical Activities	1.53***	0.59	0.01
Construction	0.95*	0.58	0.10
Mining and Quarrying	(omitted)		
Accommodation and Food Service Activities	1.11*	0.60	0.07
Wholesale and Retail Trade, Repair of Motor Vehicles	1.37***	0.53	0.01
Public Administration and Defence	(omitted)		
Education	-0.39	1.56	0.80
Electricity, Gas, Steam and Air Conditioning Supply	0.90	0.65	0.16
Human Health and Social Work Activities	1.58***	0.63	0.01
Agriculture, Forestry and Fishing	0.81	0.69	0.24
Manufacturing	1.50***	0.53	0.01
Water Supply, Sewerage, Waste management	-0.52	0.84	0.53
Real Estate Activities	(omitted)		
Constant	-362.99***	26.72	0.00
Wald chi2(32)	458.51	**Number of Obs.**	4,715
Prob > chi2	0.0000	**Pseudo R2**	0.364

*** stat. significance on 1%, ** on 5%, * 10%., (omitted) refers to a reference category or to a category with no observations.	**L. P. Likelihood**	-477.98

Given the fact that the selected covariates were found to be statistically significant when it comes to the participation in the public programme START, I proceed with the estimation of the ATET with usage of the three matching techniques – propensity score matching (PSM), kernel matching and nearest neighbour matching. However before I present the results after the matching, it is worth having a look at the raw results as they occur in the sample. The outcomes are analysed as four year averages after the intervention was over (averages for years 2011-2014), allowing me to discuss particular effects of the programme. Initially, it looks like the supported firms reported lower net profit, lower return on assets (ROA), lower return on equity (ROE), lower sales, lower assets turnover and higher debt ratio, as can be seen in the Table 3.

Table 7: Average Outcomes over the Years 2011-2014 before the Matching Procedures

Outcome	Net Profit		Return on Assets		Return on Equity		Sales		Assets Turnover		Debt Ratio	
Group	Control	Treated	Control	Treated	Control	Treated	Control	Treated	Control	Treated	Control	Treated
N	10,681	57	10,681	57	10,681	57	10,681	57	10,681	57	10,681	57
mean	6182.45	-112.5	1.48	-27.67	12.97	-70.87	124803.8	3715.8	0.82	0.43	67.60	743.85
min	-5613094	-11200	-264.5	-1624.6	-398.90	-3701.5	-2577	0	-0.05	0.00	-290.04	3.72
max	2583422	3008.	256.67	33.56	387.37	499.41	0.00	58995	132.79	4.22	399.47	37250

Obviously, the former results depicted in Table 3 suffer from the large heterogeneity and therefore it is very useful to implement matching techniques to reduce the bias. Following the methodology of the previous researchers (e. g. Dehejia and Wahba, 1999; Becker and Ichino, 2002; Abadie et al., 2004; Caliendo and Kopeining, 2008 or Bondonio, 2009) I used the three matching techniques mentioned above to achieve the lowest possible bias between the Treated and Control groups. After the estimation of the propensity score I have checked the mean and median bias and I conclude that the matching procedures

substantially reduced the bias (for standardized percentage bias across covariates see Figure 2 in Appendix). Therefore I am allowed to proceed with the interpretation of the estimated ATETs which are reported in Table 4. Out of the six indicators, the variable representing sales, was found to be the most statistically significant, proving that compared to the control group, firms which participated in the programme START (Treated) reported on average lower sales during the period of four years after the participation in the programme (2011-2014). The second statistically significant outcome variable, representing assets turnover, confirmed that firms which participated in the programme START (Treated) reported on average lower assets turnover during the period of four years after the participation in the programme (2011-2014). The remaining indicators could not prove any statistically significant impact of the programme. Noteworthy is that all three variables measuring a firm's profitability (net profit, return on assets and return on equity) suggested a negative influence of the programme, regardless of the applied matching technique. The variable representing debt ratio further suggested that firms supported by the programme reported on average higher debt ratio in comparison with the control group.

Table 8: Estimated Average Treatment Effect on the Treated (ATET) over the Years 2011-2014

Outcome Variable	Matching	*ATET*	Std. Error	P> abs. Z	N
Net Profit	Nearest Neighbour (1)	-525.137	342.190	0.125	9,238
Net Profit	PSM	-665.338	510.174	0.192	4,595
Net Profit	Kernel	-466.281	330.221	0.136	4,595
Return on Assets	Nearest Neighbour (1)	-28.715	29.078	0.323	9,238
Return on Assets	PSM	-29.068	22.731	0.201	4,595
Return on Assets	Kernel	-20.666	36.692	0.573	4,595
Return on Equity	Nearest Neighbour (1)	-84.544	69.570	0.224	9,238
Return on Equity	PSM	-92.416	64.924	0.155	4,595
Return on Equity	Kernel	-87.592	71.600	0.221	4,595
Sales	Nearest Neighbour (1)	**-7816.04*****	3168.15	0.014	9,238
Sales	PSM	**-12807.15****	6021.29	0.033	4,595
Sales	Kernel	**-16402.37*****	4168.82	0.000	4,595
Assets Turnover	Nearest Neighbour (1)	**-.770*****	0.277	0.005	9,238
Assets Turnover	PSM	-0.645	0.427	0.131	4,595
Assets Turnover	Kernel	**-0.512*****	0.145	0.000	4,595

Debt Ratio	Nearest Neighbour (1)	677.685	657.62	0.303	9,238
Debt Ratio	PSM	675.783	717.82	0.346	4,595
Debt Ratio	Kernel	709.764	689.15	0.303	4,595

Source: STATA 14, own calculations

As I have already mentioned in the introduction, such an analysis has not been conducted in the Czech Republic so far, and therefore the only remaining option is to compare the results with the findings of scholars from abroad. For instance, Garcia-Tabuenca and Crespo-Espert (2010), Gubert and Roubaud (2011) and Cowling and Siepel (2013) report a statistically significant positive impact of the participation in the programme on the performance of the supported enterprises, which was not a case in this study. Stated hypothesis (H_1), assuming a better financial performance of the supported (Treated) firms, in comparison with the control group, in terms of higher net profits, higher return on assets (ROA), higher return on equity (ROE), higher sales, higher assets turnover and lower debt ratio, based on the obtained results cannot be supported. Obtained results can be compared with the findings of Maggioni et al. (1999) or Kösters (2010) who were also unable to find positive outcomes on the performance of the supported companies by the public policies.

Despite the fact that there is a theoretical justification of the policies facilitating access to the financial capital, the presented results fit more to the point of view of scholars, who are sceptical about the public support of entrepreneurship (e. g. Åstebro, 2016 or Shane, 2009). Companies supported by the programme START do not seem to be new unicorns or high-growth enterprises increasing competitiveness of the Czech economy. They even underperform the regular (non-supported) companies. Therefore the public policy does not seem to be fulfilling its main objective. Perhaps the supported projects would not have been normally supported by the regular-market based financial institutions due to their higher risk of default or in-sufficient profitability, which cannot be appropriately assessed by the public evaluators and representatives. The owners of companies might tend to use this opportunity more than necessary and get even a higher amount of financial capital than they would have originally needed, because of the favourable conditions provided by the government. This may decrease their entrepreneurial alertness and it may lead to an increase in their risk

acceptance rates. The more risk taking firms are, the higher probability there is of a default. Decades ago, Stiglitz and Weiss (1981) described this behaviour as a moral hazard. Therefore the supported enterprises may report even higher rates of the default and worse financial results compared to the regular non-supported companies, which is of course not favourable for the tax payers who have to pay the costs of the programme (e. g. Gai et al., 2016; Zecchini and Ventura, 2009 or Oh et al., 2009).

7.6. Conclusion

The recent empirical evidence suggests that the facilitation of financial capital towards the new entrepreneurs as a way to achieve higher entrepreneurial activity, higher economic growth and higher employment rates may work. Allocation of the financial resources is usually mediated through the system of zero interest soft loans and credit guarantees provided by the governmental institutions. However the researchers also point out that it is necessary to evaluate the concrete programmes implemented in the particular regions with respect to the local conditions (e. g. Gaia et al., 2016; Perglova and Angulo-Ruiz, 2014; Bondonio and Greenbaum, 2014; Czemiel-Grzybowska, 2013; Biagi et al., 2015 or Arping et al., 2010).

Evaluations of the entrepreneurship policies in the Central and Eastern European countries have not received much research attention so far and therefore there is a substantial research gap which needs to be fulfilled (e. g. Polok et al., 2016; Dvouletý and Mareš, 2016a; 2016c or Welter and Smallbone, 2011). The main purpose of this article is to contribute to this perceived research gap by the performance of an empirical evaluation of the programme START, funded from the European Regional Development Fund (ERDF), which was providing credit guarantees and zero interest soft loans to the newly established entrepreneurs during the period of years 2007-2011 in the Czech Republic. The total amount of funds allocated to the projects from the public resources was 79.7 mil. CZK, however the projects received financial capital worth 170.3 mil. CZK in total, since the loans and guarantees have been organized within the partnerships with other market based financial institutions. Obtained results from the evaluation may be used as a supportive material for

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the future policy adjustments and as a retrospective feedback for the local policy representatives (Potluka and Brůha, 2013). The empirical analysis was conducted on the firm level and investigated changes in the financial performance of the supported firms in comparison with other non-supported firms. As for the methods, counterfactual analysis was implemented. Obtained findings could not support the hypothesis assuming a better financial performance of the supported (Treated) firms, in comparison with the control group, in terms of higher profits, higher return on assets (ROA), higher return on equity (ROE), higher sales, higher assets turnover and lower debt ratio four years after the end of programme. Supported companies reported on average lower sales and lower return on assets, compared to the control group. The remaining variables could not prove any statistically significant impact of the programme. Indicators measuring firm´s profitability (net profit, return on assets and return on equity) suggested a negative influence of the programme and the variable representing debt ratio further indicated that firms supported by the programme reported on average higher debt ratio in comparison with the control group. Moreover, four years after the end of the programme 9% of the supported firms have already been listed as economically inactive.

Nevertheless, the conducted analysis suffers from at least two limitations which need to be stated. Firstly, the outcomes of the programme could have been analysed only on the smaller share of all supported firms due to the missing data. Secondly, the supported companies were not matched with the rejected participants, who applied for the same programme and who would had been the best control group for the analysis (e. g. Pellegrini et al., 2015 or Potluka and Brůha, 2013).

Based on this empirical experience, there are many requests that need to be transferred to policy makers. It looks like public authorities and external evaluators of the programme START failed to support projects with a growth potential. Therefore the public authorities should more carefully inspect the cost structures of the projects and judge whether the amounts of requested funds are adequate for the business intentions and to filter out requests which only aim to collect as much funding as possible for the given favourable

conditions. In order to increase the quality of the evaluation process and due diligence of the project proposals, additional training of the evaluation team might be useful. Nevertheless, there are researchers (e. g. Parker and van Praag, 2006) who doubt that public sector employees could better or equally correctly screen the project proposals and to minimize information asymmetries, compared to the banks and regular market based financial institutions.

For future evaluations of the public programmes in Central and Eastern Europe, researchers need to have reliable data, which may result from the narrow cooperation between the research community and public authorities (e. g. Dvouletý and Lukeš, 2016). Such cooperation would help policy makers to establish a set of outcome indicators and pathways to their evaluation. Presented experience revealed that it is very difficult to assess the data, which are not available. It is therefore impossible to assess employment outcomes of the programme. Thus it is necessary for policy makers, setting up the rules of the programme, to include a reporting duty on the supported companies on the amount of employees, or to extract the data from the social security system. Reporting duty also needs to be imposed on financial variables and on all forms of entrepreneurship (e. g. self-employed/freelances), otherwise their data cannot be included in the evaluation. Additionally, the list of rejected participants should be available for research purposes as well. It would be excellent if the public authorities (in the case of this particular study the Czech Ministry of Industry and Trade), would collect the key financial indicators (from the balance sheets, profit and loss statements, cash flow and employees reports) by themselves and based on a mutual confidential agreement would facilitate the data to the particular research teams.

Follow-up research could investigate the potential effects of the programme on other outcome variables. An interesting variables might be growth in employment, productivity, investment intensity and assets. Another suggestion might be to investigate outcomes of the programme with respect to sectors to see, which sectors mostly benefit from public interventions.

7.7. References

Abadie, A., Drukker, D., Herr, J. L., & Imbens, G. W. (2004). Implementing matching estimators for average treatment effects in Stata. *Stata journal*, *4*, 290-311.

Acs, Z., Åstebro, T., Audretsch, D., & Robinson, D. T. (2016). Public policy to promote entrepreneurship: a call to arms. *Small Business Economics*, *47*(1), 35-51.

Antonioli, D., Marzucchi, A., & Montresor, S. (2014). Regional innovation policy and innovative behaviour: looking for additional effects. *European Planning Studies*, *22*(1), 64-83.

Arping, S., Lóránth, G., & Morrison, A. D. (2010). Public initiatives to support entrepreneurs: Credit guarantees versus co-funding. *Journal of Financial Stability*, *6*(1), 26-35.

Åstebro, T. (2016). The private financial gains to entrepreneurship: Is it a good use of public money to encourage individuals to become entrepreneurs? *Small Business Economics*, 1-7. (in print).

Asdrubali, P., & Signore, S. (2015). *The Economic Impact of EU Guarantees on Credit to SMEs Evidence from CESEE Countries* (No. 002). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

Becker, S. O., & Ichino, A. (2002). Estimation of average treatment effects based on propensity scores. *Stata journal*, *2*(4), 358-377.

Bia, M., & Mattei, A. (2012). Assessing the effect of the amount of financial aids to Piedmont firms using the generalized propensity score. *Statistical Methods & Applications*, *21*(4), 485-516.

Biagi, F., Bondonio, D., & Martini, A. (2015). *Counterfactual Impact Evaluation of Enterprise Support Programmes. Evidence from a Decade of Subsidies to Italian Firm*. European Regional Science Association.

Bisnode (2016). Database Albertina - Gold Edition. Available from www: < http://www.albertina.cz/ >. Accessed on 5 August 2016.

Blažková, I. (2016). The Impact of the Public Support for R & D on the Economic Performance of SMEs. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *64*(1), 213-222.

Bondonio, D. (2009). Impact identification strategies for evaluating business incentive programs. *POLIS Working Paper*, *129*.

Bondonio, D., & Greenbaum, R. T. (2014). Revitalizing regional economies through enterprise support policies: an impact evaluation of multiple instruments. *European Urban and Regional Studies*, 29(1), 79-103.

Bosma, N. S., Stam, F. C., & Terjesen, S. A. (2016). Advancing Public Policy for High-Growth, Female, and Social Entrepreneurs. *Public Administration*, *76*(2), 230-239.

Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of economic surveys*, *22*(1), 31-72.

Cowling, M., & Siepel, J. (2013). Public intervention in UK small firm credit markets: Value-for-money or waste of scarce resources?. *Technovation*, *33*(8), 265-275.

Craig, B. R., Jackson, W. E., & Thomson, J. B. (2007). Small Firm Finance, Credit Rationing, and the Impact of SBA-Guaranteed Lending on Local Economic Growth. *Journal of small business management*, *45*(1), 116-132.

Czech-Moravian Guarantee and Development Bank (2016). Czech-Moravian Guarantee and Development Bank. Available from www: < http://www.cmzrb.cz/?lang=2 />. Accessed on 5 August 2016.

Czemiel-Grzybowska, W. (2013). Barriers to financing small and medium business enterprises in Poland. *Business and Economic Horizons*, *9*(4), 44-52.

Čadil, J., Mirošník, K., & Rehák, J. (2017). The lack of short-term impact of cohesion policy on the competitiveness of SMEs. *International Small Business Journal*. (in print)

Dehejia, R. H., & Wahba, S. (1999). Causal effects in nonexperimental studies: Reevaluating the evaluation of training programs. *Journal of the American statistical Association*, *94*(448), 1053-1062.

Dvouletý, O. (2017a). Can Policy Makers Count with Positive Impact of Entrepreneurship on Economic Development of the Czech Regions?. *Journal of Entrepreneurship in Emerging Economies*, 9(3) (in print)

Dvouletý, O. (2017b). Determinants of Nordic Entrepreneurship. *Journal of Small Business and Enterprise Development*, 24(1), 12-33.

Dvouletý, O. (2017c). Does the Self-employment Policy Reduce Unemployment and Increase Employment? Empirical Evidence from the Czech Regions. *Central European Journal of Public Policy*, 11(2) (in print)

Dvouletý, O. (2017d). Relationship between Unemployment and Entrepreneurship Dynamics in the Czech Regions: a Panel VAR Approach. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 65(3) (in print)

Dvouletý, O., & Lukeš, M. (2016). Review of Empirical Studies on Self-Employment out of Unemployment: Do Self-Employment Policies Make a Positive Impact? *International Review of Entrepreneurship*, 14(3), 361-376.

Dvouletý, O., & Mareš, J. (2016a). Determinants of regional entrepreneurial activity in the Czech Republic. *Economic Studies & Analyses/Acta VSFS*, 10(1), 31-46.

Dvouletý, O., & Mareš, J. (2016b). Relationship between unemployment and entrepreneurial activity: Evidence found among Visegrad countries. *Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS 2016),* 146-156.

Dvouletý, O., & Mareš, J. (2016c). Entrepreneurial activity in the Czech regions: Are business companies and self-employed individuals affected by the same factors? *10th International Days of Statistics and Economics,* 418-428.

European Commission (2016a). Operational Programme Entrepreneurship and Innovation. Available from www: < http://ec.europa.eu/regional_policy/en/atlas/programmes/2007-2013/czech-republic/operational-programme-enterprises-and-innovations>. Accessed on 5 August 2016.

European Commission (2016b). European Regional Development Fund. Available from www: < http://ec.europa.eu/regional_policy/EN/funding/erdf/>. Accessed on 5 August 2016.

Foreman-Peck, J. (2013). Effectiveness and efficiency of SME innovation policy. *Small Business Economics*, *41*(1), 55-70.

Gai, L., Ielasi, F., & Rossolini, M. (2016). SMEs, public credit guarantees and mutual guarantee institutions. *Journal of Small Business and Enterprise Development*, *23*(4), 1208-1228.

Garcia-Tabuenca, A., & Crespo-Espert, J. L. (2010). Credit guarantees and SME efficiency. *Small Business Economics*, *35*(1), 113-128.

Grimm, M., & Paffhausen, A. L. (2015). Do interventions targeted at micro-entrepreneurs and small and medium-sized firms create jobs? A systematic review of the evidence for low and middle income countries. *Labour Economics*, *32*, 67-85.

Gubert, F., Roubaud, F. (2011). The Impact of Microfinance Loans on Small Informal Enterprises in Madagascar. A Panel Data Analysis. *Social Protection Discussion Paper Series*, No. 77931. World Bank.

Hartsenko, J., & Sauga, A. (2013). The role of financial support in SME and economic development in Estonia. *Business and Economic Horizons*, 9(2), 10-22.

Hawawini, G., Subramanian, V., & Verdin, P. (2003). Is performance driven by industry-or firm-specific factors? A new look at the evidence. *Strategic management journal*, *24*(1), 1-16.

Honjo, Y., & Harada, N. (2006). SME policy, financial structure and firm growth: evidence from Japan. *Small Business Economics*, *27*(4), 289-300.

Hora, O., & Suchanec, M. (2014). Zhodnocení programů aktivní politiky zaměstnanosti realizovaných v České republice v období krize. *Česká politika zaměstnanosti v době krize a po krizi. Brno/Boskovice: MUNIpress/Albert*, 143-182.

Cho, Y., Honorati, M., (2014). Entrepreneurship programs around the developing world: a meta analysis. *Labour Economics*, 28, 110–130.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics*, *3*(4), 305-360.

Kang, J. W., & Heshmati, A. (2008). Effect of credit guarantee policy on survival and performance of SMEs in Republic of Korea. *Small Business Economics*, *31*(4), 445-462.

Kim, Y., Oh, I., & Lee, J. D. (2015). Economic Impact Assessment of Public–Private Matching Fund Programs Using Firm-Level Data. *The Singapore Economic Review*, *60*(4), 1550060.

Klonowski, D. (2006). Venture capital as a method of financing enterprise development in Central and Eastern Europe. *International Journal of Emerging Markets*, *1*(2), 165-175.

Kopečná, V. (2016). Counterfactual Impact Evaluation of the Project Internships for Young Job Seekers. *Central European Journal of Public Policy*, *10*(2), 48-66.

Kösters, S. (2010). Subsidizing start-ups: policy targeting and policy effectiveness. *Journal of Industry, Competition and Trade*, *10*(3-4), 199-225.

Lukeš, M. (2013). Entrepreneurs as Innovators: A Multi-Country Study on Entrepreneurs' Innovative Behaviour. *Prague Economic Papers*, *22*(1), 72-84.

Maggioni, V., Sorrentino, M., & Williams, M. (1999). Mixed consequences of government aid for new venture creation: evidence from Italy. *Journal of Management and Governance*, *3*(3), 287-305.

Mason, C., & Brown, R. (2013). Creating good public policy to support high-growth firms. *Small Business Economics*, *40*(2), 211-225.

Mateut, S. (2017). Subsidies, financial constraints and firm innovative activities in emerging economies. *Small Business Economics*. (in print)

Millán, J. M., Congregado, E., & Román, C. (2014). Persistence in entrepreneurship and its implications for the European entrepreneurial promotion policy. *Journal of Policy Modeling*, *36*(1), 83-106.

Ministry of Industry and Trade (2016a). Programme START. Available from www: < http://www.mpo-oppi.cz/start/>. Accessed on 5 August 2016.

Ministry of Industry and Trade (2016b). List of Supported Companies. Available from www: < http://www.mpo.cz/dokument141459.html>. Accessed on 5 August 2016.

Mirošník, K., Čadil, J., & Čermáková, K. (2016). Small business and cohesion policy-statistical evidence from the Czech Republic. *International Journal of Entrepreneurship and Small Business*, *29*(3), 398-415.

Oh, I., Lee, J. D., Heshmati, A., & Choi, G. G. (2009). Evaluation of credit guarantee policy using propensity score matching. *Small Business Economics*, *33*(3), 335-351.

Pellegrini, G., Bernini, C., & Cerqua, A. (2015). Public subsidies, TFP and Efficiency: a tale of complex relationships. In *ERSA conference papers* (No. ersa15p461). European Regional Science Association.

Pergelova, A., & Angulo-Ruiz, F. (2014). The impact of government financial support on the performance of new firms: the role of competitive advantage as an intermediate outcome. *Entrepreneurship & Regional Development*, *26*(9-10), 663-705.

Angrist, J. D., & Pischke, J. S. (2008). *Mostly harmless econometrics: An empiricist's companion*. Princeton university press.

Parker, S. C., & Van Praag, C. M. (2006). Schooling, capital constraints, and entrepreneurial performance: The endogenous triangle. *Journal of Business & Economic Statistics*, *24*(4), 416-431.

Polok, D., Michalski, P., Szewczyk, D., Keil, D., Wieczore, S., Kaciakova, P., Incze, Z., Rycerz, J., Nisztuk, T., Dvouletý, O., & Krzemiński, P. (2016). *Future of the Visegrad Group*.
Accessed on 17th October 2016. www: < http://paga.org.pl/projekty/raport-future-of-the-visegrad-group/future-of-the-visegrad-group/report?lang=en >.

Potluka, O., Brůha, J. (2013). Zkušenosti s kontrafaktuální dopadovou evaluací v České republice. *Evaluační teorie a praxe* 1(1), 53–68.

Potluka, O., Brůha, J., Špaček, M., Loun, J. (2013). The Impacts of Subsidies on Czech Firms. *Statistika: ekonomicko-statistický časopis* 50(4), 56-62.

Potluka, O., Brůha, J., Špaček, M., Vrbová, L. (2016). Counterfactual Impact Evaluation on EU Cohesion Policy Interventions in Training in Companies. *Ekonomický časopis* 64(6), 575-595.

Shane, S. A. (Ed.). (2007). *Economic development through entrepreneurship: Government, university and business linkages*. Edward Elgar Publishing.

Shane, S. (2009). Why encouraging more people to become entrepreneurs is bad public policy. *Small business economics*, *33*(2), 141-149.

Srholec, M., & Žížalová, P. (2014). Mapping the Geography of R&D: What Can We Learn for Regional Innovation Policy in the Czech Republic and Beyond?. *European Planning Studies*, *22*(9), 1862-1878.

Sternberg, R. (2014). Success factors of university-spin-offs: Regional government support programs versus regional environment. *Technovation*, 34(3), 137-148.

Stevenson, L., & Lundström, A. (2001). *Patterns and Trends in Entrepreneurship / SME Policy and Practice in Ten Economies*, Stockholm: Swedish Foundation for Small Business Research

Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American economic review*, *71*(3), 393-410.

Stonkute, E., & Vveinhardt, J. (2017). Rural Development Policy Incentives encouraging Entrepreneurship in selected EU Countries. *Economic Science for Rural Development Conference Proceedings* (No. 44), 197-204.

Thurik, A. R. (2009). Entreprenomics: entrepreneurship, economic growth and policy. *Entrepreneurship, growth and public policy*, 219-249.

Van Praag, C. M., & Versloot, P. H. (2007). What is the value of entrepreneurship? A review of recent research. *Small business economics*, *29*(4), 351-382.

Van Stel, A., & Storey, D. (2004). The link between firm births and job creation: Is there a Upas tree effect? *Regional Studies*, *38*(8), 893-909.

Welter, F., & Smallbone, D. (Eds.). (2011). *Handbook of research on entrepreneurship policies in central and eastern Europe*. Edward Elgar Publishing.

Zecchini, S., & Ventura, M. (2009). The impact of public guarantees on credit to SMEs. *Small Business Economics*, *32*(2), 191-206.

7.8. Appendix

Figure 2: Standardized percentage bias across covariates.
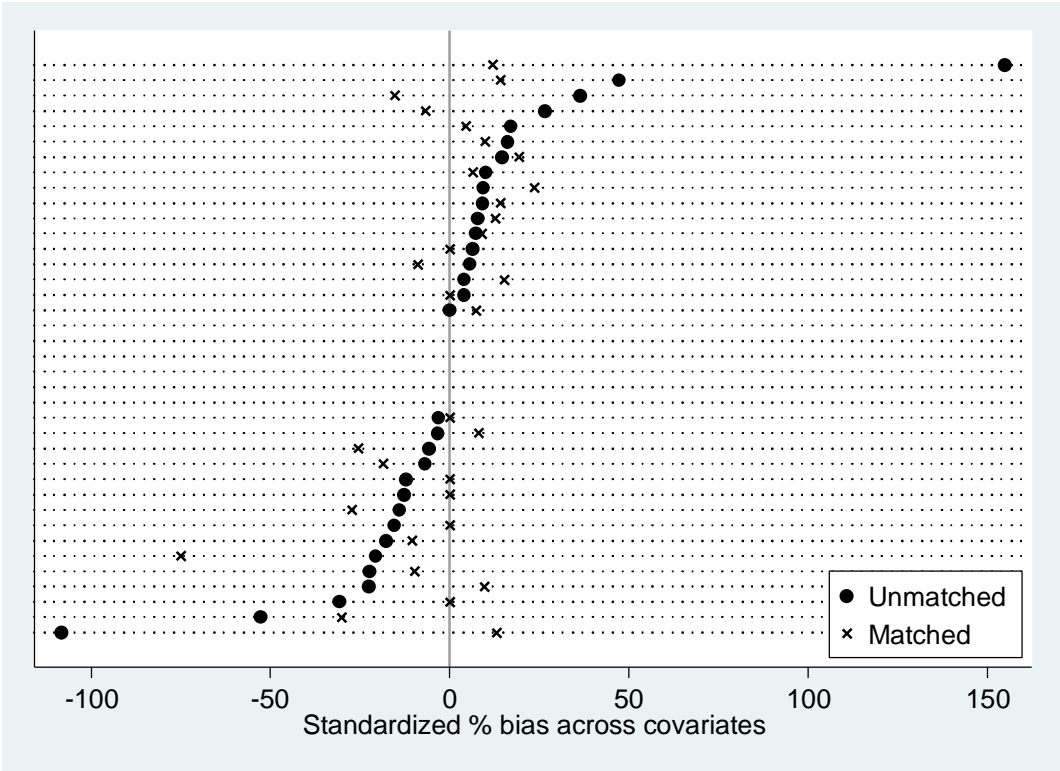
8. Annex No. 1 - Determinants of Regional Entrepreneurial Activity in the Czech Republic[12]

Abstract

The following study is focused on analysis of registered businesses in the 14 regions of the Czech Republic during the period of years 1995-2013. The aim of the study was to quantify factors that affect entrepreneurial activity expressed as rate of registered businesses per capita. Based on the previous empirical studies, the determinants were selected and hypothesis stated. Formed hypothesis investigated positive impact of GDP per capita, unemployment rate and R&D institutions on rate of registered business activity. To evaluate them, data were obtained from the Czech Statistical Office and formed into dataset. Firstly, panel regressions estimated with fixed effects method were employed and secondly, Granger causality tests to evaluate the relationship between entrepreneurial activity and GDP per capita were used. Regression estimates proved positive relationship between entrepreneurial activity in Czech regions and GDP per capita, unemployment rate and support activities of R&D institutions. Positive impact was also confirmed for population density, average age, share of tertiary educated population and real R&D expenditures. Testing Granger causality proved dual causality between entrepreneurial activity and GDP per capita confirming that GDP per capita as good predictor of economic development of Czech regions. Finally, economic growth motivates Czech individuals to enter entrepreneurial activity.

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[12] Dvouletý, O., & Mareš, J. (2016). Determinants of regional entrepreneurial activity in the Czech Republic. *Economic Studies & Analyses/Acta VSFS*, 10(1), 31-46. Available on: http://www.vsfs.cz/periodika/acta-2016-01.pdf

8.1. Introduction

Entrepreneurship was identified as important part of the economy contributing to economic growth measured by country´s GDP (Carree and Thurik, 2010). Positive relationship between entrepreneurial activity and economic growth was also confirmed by Thurik (1995); Berkowitz and DeJong (2005); Van Praag et al. (2007) or Klapper et al. (2015). However there are still authors who argue that those positive effects on GDP and employment vary over time and across countries (Blanchflower, 2000). Carree and Thurik (2010) point out, that there exists dual causality between the entrepreneurial activity and economic growth and encourage scholars to investigate these phenomena on different levels of analysis. Statistical offices and Global Entrepreneurship Monitor reporting entrepreneurial activity allow us to study these kind of relationships in various contexts. Importance of studying entrepreneurship increased with the need to regain competitive advantages after structural changes in modern economies in 21st century.

What are the determining factors having impact on entrepreneurship and how can we increase entrepreneurial activity? Entrepreneurship is cross-disciplinary area, with determinants from psychological, sociological and economical disciplines. Psychology is focused on traits of entrepreneurs and potential entrepreneurs, Sociology on collective background and Economics on impact of economic climate, technological development and demographic trends (Giannetti and Simonov, 2004). The determinants also differ with the level of analysis, which may be conducted on individual (micro), meso (industry or region) or macro (country or group of countries) level (Grilo and Thurik, 2004). Not many studies are focused on regional entrepreneurial activity and therefore research gap on this level exists. On regional level entrepreneurs are perceived as engine of regional development and

this level of analysis allows researchers to take into account also geographical and cultural differences (Leitao et al., 2011).

Based on Global Entrepreneurship Monitor, in 2013 on average 5.3 % of Czech adult population was engaged into established entrepreneurial activity (Lukeš et al., 2014). We have investigated previous empirical studies and conclude that there are not many studies dedicated to determinants of entrepreneurship in relation to all regions of the Czech Republic, and that none of the scholars tested the relationship between the entrepreneurial activity and economic growth in both directions using more robust econometric approach. Our analysis is conducted from economic perspective and serves as complement to already published research studies focused on the Czech entrepreneurial activity which are also in this paper presented.

In the first (theoretical) part we introduce previous studies devoted to determinants of entrepreneurial activity and develop tested hypothesis. Second part describes collected variables for the analysed period of years 1995-2013 and third section employs econometric models to fulfil our research aim, identification of the main factors having impact on entrepreneurial activity in the regions of the Czech Republic. Finally, Granger Causality test deals up with the dual causality between the entrepreneurial activity and GDP per capita. Main findings, limitations of our approach and suggestions for future research are summarized in conclusions.

8.2. Theoretical Background

Coleman (1988) explains that every entrepreneur needs to be equipped with resources, which include physical, financial, human and socio-cultural capital. It has been stated by Gartner (1985) that venture creation is a multi-dimensional phenomenon and should be looked upon with all the complexities. Sandberg and Hofer (1988) mention that performance of a newly established venture is influenced by the structure of the industry, where the business operates, its organisational structure and strategy. Stuart and Sorenson (2003) perceive the geographical location of newly established venture as a key determinant of success as some

areas have better infrastructure and access to resources. Besides all forms capital, entrepreneur needs to have certain level of self-confidence, willpower and ability to build networks.

Entrepreneurs typically build networks in the region where they are involved in their activity, and hence their ability to succeed in networking may be affected by regional characteristics. As remarks Karlsson et al. (1993), business environment consists of all relevant socio, economic and cultural variables. Differences in regional entrepreneurial activity may be described by four models (market model, resource model, milieu model and career model). Karlsson et al. (1993) proved positive relationship between newly established entrepreneurial activity per thousands of households and GDP per capita, population with tertiary education, public expenses for regional development and share of economically active population.

Grilo and Thurik (2004) divide determinants of entrepreneurship into supply and demand side. The supply side is determined by population characteristics, such as size, growth, age structure, population density and share of immigrants. Economic development, globalization and stage of technological development are considered as demand side of entrepreneurship. They also explain that once the overall economic performance is declining, the wages and salaries are declining and the entrepreneurial activity decreases. On the other hand, the increase in unemployment rate force individuals to create jobs for themselves by engaging into entrepreneurial activity, so there are two effects acting against each other and it is important to analyse, which exceeds. This varies among countries and time period. The main finding of Grilo and Thurik (2004) was that lack of financial resources does not have impact on entrepreneurial activity. Secondly, they find that administrative barriers negatively influence entrepreneurial engagement. They also stress that for the most of the included variables we can observe ambiguous impact on entrepreneurial activity.

Wennekers et al. (2005) worked with Global Entrepreneurship Monitor and used as explanatory variables GDP per capita for economic variables and education (tertiary and secondary) as demographic. They present positive effect of income and education on

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entrepreneurial activity. Freytag and Thurik (2007) analysed the role of cultural variables on entrepreneurial aspirations. As cultural variables they used proxy variables social spending, regulations (barriers), political and other organizations, economic freedom index and life expectancy index. Life expectancy, social and health expenditures confirmed negative impact on preferences towards entrepreneurship. Index of economic freedom had positive impact on entrepreneurial aspirations.

Roig-Tierno et al. (2015) stress the importance of supportive infrastructure, such as business incubators, technology centres and universities. Regarding to their research, supportive infrastructure have the highest impact on innovative entrepreneurship. The aim of these institutions is to boost innovative activity and commercialize it as a product or service. Business sector has therefore interest to establish networks with these R&D institutions, which act with each other complementarily. Roig-Tierno et al. (2015) found positive effects on employment creation. Also investments into R&D create scientific knowledge and therefore new entrepreneurial opportunities. These opportunities are exploited by entrepreneurs who commercialize them and therefore the entrepreneurial activity increases (Sanders, 2007). Grilo and Thurik, (2004) also support this argument stating that R&D investments support technological advancements and stimulate entrepreneurial activity.

Currently, scholars in determinants go back to investigation of relationship between entrepreneurial activity, unemployment and GDP per capita, since there are more counter effects at the same time. When unemployment is high, unemployed individuals may choose to become entrepreneurs and enter the market introducing a new technological innovation since they need to make income for living. (Llopis et al., 2015). Positive relationship between entrepreneurship, quantified as rate of new business registrations, and unemployment rate confirmed by Fritsch et al. (2015). However, Cueto et al. (2015) argue that positive relationship between unemployment rate and entrepreneurship occurs only when unemployment increases substantially. Koellinger and Thurik (2012) conclude that increase in entrepreneurial activity was associated with the increase of GDP and decrease of

unemployment. They also found that future trends in entrepreneurship help to predict economic fluctuations using Granger tests of causality, VAR models and fixed effects regression estimations. On the other hand economic growth stimulates creation of new opportunities and leads to increase in entrepreneurial activity. Authors conclude, that it is important to use lags, some effects may take several years to occur. In their models, they use two years lag. Klapper et al. (2015) also proved positive, pro-cyclical relationship between GDP per capita and entrepreneurial activity. However those relationships vary over time and need to be analysed over time and across countries (Llopis et al., 2015).

Entrepreneurial activity in the Czech Republic is most frequently investigated by researchers from micro and meso level perspective, mostly surveying individual entrepreneurs and managers of companies. Lukeš et al. (2014) conducted Global Entrepreneurship Monitor in 2013 for the Czech Republic and conclude that on average 7.3 % of adult population aged 18-64 years was actively involved in setting up business and on average 5.3 % of adult population was running established business.[13] According to interviewed entrepreneurs, the biggest problems in business activity are lack of contracts, administrative barriers, bureaucracy, frequent changes in laws and chaotic system of taxation. Strýčková (2015) conducted research focused on determinants of capital structure of Czech enterprises and concludes that key external factors of capital structure were economic and political development, market environment and levels of taxes and interest rates. Small business enterprises (SMEs) in selected regions of the Czech Republic and Slovakia were investigated by Belás et al. (2015). According to their findings the most important motive for starting a business in the Czech Republic was to have a job. In Slovakia, the most important motive for starting a business was money. Belás et al. (2015) confirmed that Czech business environment is affected by relatively high level of corruption and also

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[13] Running business for more than 42 months and paying salaries or wages to its owners (Lukeš et al., 2014).

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that Czech entrepreneurs are perceived on public still negatively. Role of state was by surveyed entrepreneurs perceived negatively, highlighting creation of meaningless barriers and obstacles. These results of entrepreneurial perceptions are also described by World Economic Forum (2016) reporting the most problematic factors for doing business in the Czech Republic. The most problematic factors are inefficient government bureaucracy, corruption, policy instability, complexity of tax regulations and restrictive labour regulations (World Economic Forum, 2016).

Despite increasing research interest in the Czech entrepreneurship, studies focused on determinants of population of active enterprises, using previously introduced methodology, conducted on macro (country) level, are still very limited. One of the recent attempts to study registered business activity on country level was conducted by Menčlová (2014) for period of years 1992-2011 using only bivariate correlation analysis to investigate relationship between entrepreneurial activity, unemployment rate and GDP growth. Menčlová (2014) was unable to prove statistically significant relationship with GDP on level base. Some relationship was proved for the GDP growth lagged by one year for newly registered companies with more than 20 employees. For the unemployment rate, negative correlation coefficient was statistically proved for joint-stock companies and companies with limited liabilities. Menčlová (2014) did not find any empirical support for impact of economic recession in 2009 on entrepreneurial activity. However study using more robust econometric approach investigating whole population of the Czech active enterprises applied by Koellinger and Thurik (2012) is still missing and allowing us to fill in this research gap by its implementation in the Czech environment. The next session informs reader about our methodological approach and tested hypothesis.

8.2.1. Method and Tested Hypothesis

Based on the theoretical background and methodology applied by previous authors (Koellinger and Thurik, 2012) we developed following hypothesis that are tested:

H_1: There is a positive relationship between entrepreneurial activity and GDP per capita.

H$_2$: There is a positive relationship between entrepreneurial activity and unemployment rate.

**H$_3$**: There is a positive relationship between entrepreneurial activity and R&D institutions.

H$_4$: Entrepreneurial activity predicts the economic development.

To confirm/reject the hypothesis we use econometric approach based on collected data. For the first three hypotheses (H1-H3) we construct regression models with lagged variables (with impact up to two years lag) and for the fourth hypothesis (H4) we employ Granger causality test. The next part is dedicated to introduction of the dataset.

8.3. *Data*

Data were obtained from different parts of Czech Statistical Office database (ČSÚ, 2015) and formed into a panel of 14 regions of the Czech Republic for period of years 1995-2013. Unfortunately not all variables mentioned in previous studies were available for our analysis so we tried to obtain as many relevant variables as possible and for the longest available period. The dependent variable was set up as amount of registered businesses per capita (*REG_BUSINESSES_CAP*), representing entrepreneurial activity. It would be most appropriate to have entrepreneurial activity obtained from population survey like Global Entrepreneurship Monitor, however such a data are still not available for longer time period. There are two limitations following this approach, firstly as mention Koellinger and Thurik (2012) we do not have covered early stages of entrepreneurial activity and secondly, there are businesses which are officially registered but not in reality active. Taking this limitation we are allowed to compare regions of the Czech Republic in panel regression.

Figure 5: Average registered business activity in Czech regions[14] during years 1995-2013
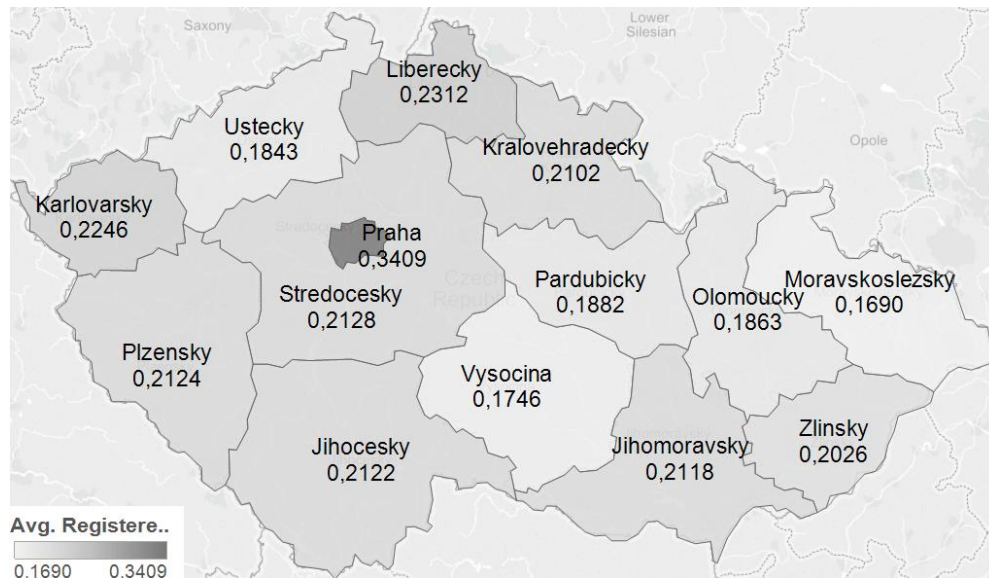
On Figure 1 we have plotted average entrepreneurial activity based upon our calculations during years 1995-2013. As expected the highest rate of registered businesses is in the Capital Praha which may affect results of regression analysis as outlier, so we notice that for validity of regression models. The lowest level of entrepreneurial activity was found in Moravskoslezsky region. The difference between registered business activity in 1995 and 2013 are depicted on Figure 3 in Appendix. Over the analysed period, in all regions total entrepreneurial activity significantly increased as can be seen on Figure 2.

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[14] English equivalent names of the Czech regions: Praha - Prague, Stredocesky - Central Bohemia, Jihocesky - South Bohemia, Plzensky - Plzen, Karlovarsky - Karlovy Vary, Ustecky - Usti nad Labem, Liberecky - Liberec, Kralovehradecky - Hradec Kralove, Pardubicky - Pardubice, Olomoucky - Olomouc, Moravskoslezsky - Moravia-Silesia, Jihomoravsky - South Moravia, Zlinsky - Zlin, Vysocina - Vysocina.

Figure 6: Rate of Registered Businesses per Capita over years in Czech regions
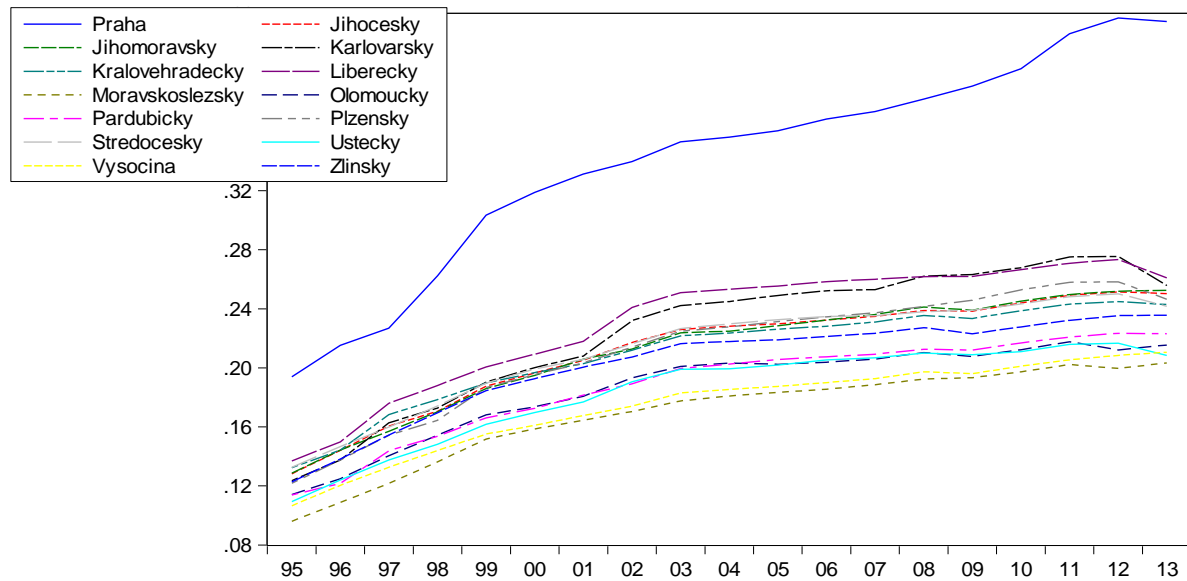
Among explanatory variables we were able to collect for all regions average age of population (*AVERAGE_AGE*), where we assume positive sign, since entrepreneurial activity requires collecting resources. For unemployment rate (*UNEMPLOYMENT_RATE*) we expect positive sign since during higher levels of unemployment people switch from unemployment into self-employment. Business enterprise R&D expenditures in mil. CZK is calculated per capita (*REAL_EXP_RD_CAPITA*) and we assume that support of R&D will stimulate technological and innovation driven businesses. For GDP per capita in CZK (*REAL_GDP_PER_CAPITA*) we expected also positive sign as indicator of increasing economic performance of economy motivating individuals to engage into entrepreneurship (pro-cyclical relationship). Number of Business enterprise workplaces (subjects mainly focused on R&D) in responding units per thousands of inhabitants (*WORKPLACES_RD_THINH*) as variable representing of supportive infrastructure (positive sign). Share of economically active population between 15 and 64 years (*SHARE_PUPULATION_1564*) as factor for supply side of entrepreneurship together with population density (*POPULATION_DENSITY*) positively affecting entrepreneurship. Share of population obtaining tertiary education for demographic variable and resource model

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(*TERTIARY_EDUCATION*) positively affecting registered businesses per capita. GDP per capita and business enterprise R&D expenditures had to be converted into real variables using Consumer Price Index (CPI) with base year 2005. Unfortunately data for variables representing R&D workplaces and real R&D expenditures of business enterprises were available only for period of years 2005-2013. Descriptive statistics for all variables are presented in Table 1.

Table 9: Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
AVERAGE_AGE	39.49	39.67	42.03	36.00	1.50	266
REG_BUSINESSES_CAP	0.21	0.21	0.44	0.10	0.06	266
UNEMPLOYMENT_RATE	6.71	6.32	15.97	1.90	2.87	266
REAL_EXP_RD_CAPITA	0.002	0.002	0.008	0.0002	0.001	126
REAL_GDP_PER_CAPITA	276369.2	249999.7	766349.1	194983.4	100161.7	266
WORKPLACES_RD_THINH	0.21	0.18	0.55	0.05	0.11	126
SHARE_POPULATION_1564	0.70	0.70	0.72	0.67	0.01	266
POPULATION_DENSITY	287.74	118.23	2533.92	62.11	597.60	265
TERTIARY_EDUCATION	10.55	10.39	21.72	4.81	2.79	266

Source: EViews, own elaboration

8.3.1. Stationarity

We are working with panel data which are combination of time series and cross sections. From 1980s econometricians wrote articles about estimation of econometric models on non-stationary data that led into so called spurious regression giving misleading results. Stationarity is tested using joint Dickey-Fuller test for all regions of the Czech Republic. The null hypothesis states non-stationarity of the variable (existence of unit root). By rejecting the null hypothesis, we are able to accept alternative hypothesis of stationarity of the variable (Verbeek, 2012). All variables were tested for stationarity and for all of them we were able to reject the null hypothesis of non-stationarity on 5% level of statistical significance and conclude that we are working with stationary data (results are presented in Table 2).

Table 10: Stationarity Testing Results

Variable	Stat. Significance	P-Value	Result
AVERAGE_AGE	5%	0.00	Stationary
POPULATION_DENSITY	5%	0.049	Stationary
REAL_EXP_RD_CAPITA	5%	0.05	Stationary
REAL_GDP_PER_CAPITA	5%	0.001	Stationary
REG_BUSINESSES_CAP	5%	0.00	Stationary
SHARE_POPULATION_1564	5%	0.00	Stationary
UNEMPLOYMENT_RATE	5%	0.00	Stationary
TERTIARY_EDUCATION	5%	0.00	Stationary
WORKPLACES_RD_THINH	5%	0.03	Stationary

Source: EViews, own elaboration

8.4. Regression Analysis

For quantification of the relationships among variables, regression analysis is employed. All econometric models were estimated using software EViews 8. As we mentioned before, the aim of regression analysis is to investigate, which factors affect rate of registered businesses in the Czech Republic and evaluate stated hypothesis from section 1.1.

8.4.1. Estimation of Econometric Models

Firstly we had to choose suitable estimation technique. Usually for legal entities, fixed effects estimation is used, because those entities remain the very same over the time. To support our expectations, we used Hausman test which helps us to decide between estimation with fixed and random effects. Hausman test confirmed for our data estimation with fixed effects that helps us to control unobserved heterogeneity in our models (Verbeek, 2012). Then the econometric models were estimated with fixed effects and White cross-section standard errors & covariance (d.f. corrected) which helps us to avoid consequences of heteroscedasticity and autocorrelation. In all regression estimates we controlled the level of multicollinearity and also checked the normality of residuals. Unfortunately, some of our models violate assumption of normality of residuals which restrict our options to generalize results on other states and regions. Estimated models are depicted in Table 3.

Models 1 and 2 covered whole period, however, for the variables R&D workplaces and real R&D expenditures we did not have observations for the whole period so they were estimated separately (Models 3 and 4 in Table 3). R&D variables highly correlated with real GDP per capita, so in those models, the variable representing real GDP per capita had to be excluded to satisfy assumption of acceptable level of collinearity tested using Variance Inflation Factors test. Collinearity problems also occurred between unemployment rate and share of tertiary educated population. Therefore we estimated two models with unemployment rate and two models with tertiary education, to satisfy acceptable level of collinearity in regression models. To make sure that region Praha does not bias the results of the regressions the presented models were estimated without this region, however results of estimated reduced regressions brought us the same results so finally region Praha was kept in the final models. The following section interprets results of regression analysis.

8.4.2. Results and Discussion

Before interpreting individual explanatory variables, we conclude that our constructed models have high explanatory power of the dependent variable represented by the rate of registered business activity in the Czech regions. The most contributing variables explaining variety in business activity were share of tertiary education, GDP per capita and unemployment rate explaining majority of the variability of the dependent variable. In the first model (Model 1) we found empirical support for positive impact of GDP per capita ceteris paribus, mirroring economic situation of the Czech regions. All variables in the first model were found to be statistically significant at least on 10% level of statistical significance. These results are not in agreement with sign obtained by Menčlová (2014), however are in consistency with previous researchers using similar methodology, such as Koellinger and Thurik (2012) or Klapper et al. (2015). We support obtained positive signs of coefficients by explanation that new opportunities reveal, once the economy grows and therefore people are motivated to create ventures (entrepreneurship driven by opportunities).

Positive sign was obtained also for the variables representing population density, average age and share of tertiary educated population offering explanation that Czech

entrepreneurs engage more into business creation once they obtain relevant amount of experience, networks and education, resource based view on entrepreneurship, which was described by Wennekers et al. (2005). Increase in population density leads to higher volume of interactions among economic agents and increase in networking which is according to previous research (Stuart and Sorenson, 2003) positively associated with entrepreneurial activity. The positive sign of average age may be interpreted as proxy variable for increase in experience of population which could be used for engagement into business activity. More educated individuals are able to implement and commercialize outputs of scientific research. Unfortunately, estimated econometric models did not agree on the impact of share of economically active population providing contradictory signs, therefore this question is still open for future research.

Variable representing economic crisis during years 2008-2010 revealed that in comparison with other periods, entrepreneurial activity was during years 2008-2010 higher. Positive response of entrepreneurial activity towards significant increase in unemployment rate during economic recessions was described by Cueto et al. (2015). Second model (Model 2) was focused on the impact of unemployment rate. The variable representing unemployment rate was included in level form, first lag and second lag. Despite the fact, that first lag was not found to be statistically significant, all coefficients were positive, again contrary to the findings obtained by Menčlová (2014), but in accordance with positive sign reported by Fritsch et al. (2015) or Belás et al. (2015) who argue that the most frequent motivation of the Czech entrepreneurs for entering business activity was to have a job. Therefore increase in unemployment rate was associated with higher engagement of Czech economic agents into entrepreneurship (becoming self-employed or setting up a new enterprises) covered by theory of necessity entrepreneurship.

Third and fourth model (Model 3 and Model 4) were estimated only for period years 2005-2013 because of lack of the data depicting R&D sector. The models supported previously introduced positive signs of coefficients for population density, average age, tertiary education and unemployment rate. Model 3 tested the impact of R&D workplaces

on registered business activity. The results confirmed positive impact of research institutions on business activity through improving socio-cultural networks and supportive activities mentioned by Roig-Tierno et al. (2015). The last econometric model (Model 4) tested the impact of real R&D expenditures on entrepreneurial activity and both estimated coefficients were positive. However, only coefficient of R&D expenditures lagged by one year was found to be statistically significant. This result may be explained by delays caused by distribution of new scientific knowledge towards entrepreneurs and potential entrepreneurs and by time required for transferring knowledge into product or service. Positive impact of R&D expenditures was also obtained by (Sanders, 2007).

Summing up results of regression estimates we are able to accept first three hypotheses stating that there exists positive relationship between entrepreneurial activity in the Czech regions and GDP per capita, unemployment rate and support activities of R&D institutions. Hypothesis H_1, H_2 and H_3 are accepted.

Table 11: Model Table

Variable / Model	Model 1	Model 2	Model 3	Model 4
Dependent Variable:	*REGISTERED_BUSINESSES_PER_CAPITA*			
CONSTANT	**0.002249***	**-1.174835*****	**-0.017757*****	**-0.169627**
	0.001207	0.118169	0.000995	0.207964
REAL_GDP_PER_CAPITA	**3.02E-09*****			
	3.64E-10			
POPULATION_DENSITY	**3.94E-06*****	**0.000525*****	**4.56E-06*****	
	5.22E-07	9.78E-05	8.74E-07	
AVERAGE_AGE	**0.000174*****	**0.020583*****	**0.000341*****	**0.008861***
	1.88E-05	0.000807	2.33E-05	0.005175
SHARE_POPULATION _1564	**-0.017400*****	**0.582044*****		
	0.001157	0.127560		
UNEMPLOYMENT_RATE		**0.001276*****		**0.000398**
		0.000491		0.001612
UNEMPLOYMENT_RATE (-1)		**0.000453**		
		0.000626		
UNEMPLOYMENT_RATE (-2)		**0.001045***		
		0.000592		
TERTIARY_EDUCATION	**0.020021*****		**0.020272*****	

	4.75E-05		2.13E-05	
TERTIARY_EDUCATION (-1)	**0.000131***</br>3.41E-05			
ECONOMIC_CRISIS	**0.000144***</br>2.36E-05			
WORKPLACES_RD_THINH			**0.000668**</br>0.000319	
WORKPLACES_RD_THINH (-1)			**0.001126***</br>0.000356	
REAL_EXP_RD_CAPITA				**7.730759**</br>7.360853
REAL_EXP_RD_CAPITA (-1)				**16.96424**</br>7.661041
R-squared	0.999998	0.952742	0.999998	0.582432
Adj. R-squared	0.999997	0.948604	0.999998	0.566822
F-statistic	4687862.	230.2530	3143024.	37.31144
Observations	251	237	111	112
Note: Standard Errors are in parenthesis, *** stat. significance on 1 %, ** stat. significance on 5 %, * stat. significance on 10 %.				

Source: EViews, own elaboration

8.5. *Entrepreneurship and Economic Growth – Dual Causality*

This part tests the relationship between entrepreneurial activity and GDP per capita in the sense of Granger causality evaluation, testing to what extend are variables able to predict future values based on their previous values. The null hypothesis states that there is no Granger-Causality between tested variables, by rejecting it we are allowed to accept alternative hypothesis of existence of such relationship (Granger, 1969). Results of the tests are reported in Table 4. On 5% level of statistical significance we are able to reject the null hypothesis and accept the alternative. This result was controlled also using lags 2 and 5 obtaining the same result. GDP per capita Granger causes entrepreneurial activity and also, entrepreneurial activity Granger causes GDP per capita which is in agreement with results obtained by Koellinger and Thurik (2012). We verify **H4** that entrepreneurial activity predicts the economic development of the Czech regions. Arguing that firstly, economic growth motivates additional individuals to engage into entrepreneurial activity, however

also, entrepreneurial activity is good predictor of economic development of the Czech regions.

Table 12: Granger Causality between Entrepreneurship and Economic Growth

Tested Relationship	P-value	Lags	H₀ Reject
REAL_GDP_PER_CAPITA → REGISTERED_BUSINESSES_PER_CAPITA	0.00	10	Rejected
REGISTERED_BUSINESSES_PER_CAPITA → REAL_GDP_PER_CAPITA	0.00	10	Rejected

Source: EViews, own elaboration

8.6. Conclusions

This paper aimed to investigate relationship between the rates of registered businesses in the fourteen regions of the Czech Republic during period of years 1995-2013. Following previous studies, existing models explaining differences in regional business activity were discussed. We also introduced empirical findings of previous scholars and variables they suggest to take into account when determining factors having impact on entrepreneurial activity. Based on the previous research studies we developed four hypotheses which were tested in the empirical part of the article. Dataset was created based on variables collected from the Czech Statistical Office. Firstly we estimated econometric models using fixed effects method approach with lags to determine variables having impact on entrepreneurial activity. We were able to accept the hypothesis assuming positive relationship between entrepreneurial activity in the Czech regions and GDP per capita, unemployment rate and support activities of R&D institutions. This leads to main conclusion that during times of higher unemployment rate Czech people become self-employed or set up their own business to earn income. Positive impact was also confirmed for population density, average age, and share of tertiary educated population supporting resource based view when explaining diversity among regional entrepreneurial engagement. Increase in real R&D expenditures

suggested positive impact on entrepreneurial activity. The second part of empirical analysis tested the relationship between GDP per capita and entrepreneurial activity using Granger causality test. Dual causality was statistically confirmed, so entrepreneurial activity is a good predictor of economic development of the Czech regions and on the other hand, economic growth motivates additional individuals to engage into entrepreneurial activity by bringing new business opportunities.

However, presented results have also several limitations that must be taken into account. First of them is related to operationalization of entrepreneurial activity expressed as rate of registered businesses in the Czech regions. The number of registered business may be in reality higher in comparison with real active enterprises for two reasons. Firstly, in the economy, there are businesses that are officially registered, however they are not active anymore, and secondly, some of registered entrepreneurs are in reality employees working under schwarz system conditions. On the other hand, in the registered business activity are not covered early stages of entrepreneurial activity, such as nascent entrepreneurship. Therefore it will be beneficial to operationalize entrepreneurial activity in a different way, such as based on population surveys (Global Entrepreneurship Monitor) to check our results. Unfortunately, data from population surveys so far do not cover even national entrepreneurial activity in sufficiently long time series nor on regional level. Also, more frequent data than annual, such as quarterly or monthly will be necessary to provide deeper insight into determinants of the Czech entrepreneurship. Since we were able to collect only data for period of years 1993-2013, we need to wait until updated data will be published to be able to increase our research sample. More frequent data and larger data set allow to implement more sophisticated econometric techniques, such as Vector Autoregressive models (VAR) and construction of impulse response functions.

As for policy recommendation, we suggest entrepreneurial policy makers to be prepared to organize entrepreneurial education, such as trainings and workshops, and allocate more resources towards entrepreneurial infrastructure, such as science parks and business incubators, to support current, potential and new entrepreneurs during times of

higher unemployment rate that was already mentioned for example by Lukeš et al. (2014). We further encourage any initiatives trying to monitor entrepreneurial activity and recommend allocation of resources towards more detailed monitoring of the Czech entrepreneurship. Finally in our research we made no difference between various types of entrepreneurial activity. Business companies and self-employed individuals have its specific characteristics and therefore their determinants may differ. Studies investigating them separately should become a challenge for future researchers. More determinants of the Czech regional entrepreneurial activity should also be tested, we suggest to investigate the impact of share of immigrant population, share of economically active population, regional corruption perceptions or regional entrepreneurial subsidies.

8.7. References

Belás, J. et al., 2015. The business environment of small and medium-sized enterprises in selected regions of the Czech Republic and Slovakia. *E+M Ekonomie a Management*, (1), pp.95–110.

Berkowitz, D. & DeJong, D.N., 2005. Entrepreneurship and Post-socialist Growth*. *Oxford Bulletin of Economics and Statistics*, 67(1), pp.25–46.

Blanchflower, D.G., 2000. Self-employment in OECD countries. *Labour Economics*, 7(5), pp.471–505.

Carree, M. & Thurik, A., 2010. The impact of entrepreneurship on economic growth. *Handbook of entrepreneurship research*.

Coleman, J. S. 1988. Social capital in the creation of human capital. *American journal of sociology*, (pp. 95-120).

Cueto, B., Mayor, M. & Suárez, P., 2015. Entrepreneurship and unemployment in Spain: a regional analysis. *Applied Economics Letters*, 22(15), pp.1230-1235.

ČSÚ (Czech Statistical Office) [online]. 2015 [cit. 2015-11-20]. Available from: https://www.czso.cz/csu/czso/regionalni_casove_rady.

Dvouletý, O. & Mareš, J., 2015. Analysis of Factors Influencing Development of Registered Businesses in the Czech Republic. *Ekonomie a finance – výsledky výzkumu doktorandů: Sborník příspěvků z konference doktorandů na Vysoké škole finanční a správní, Praha*.

Freytag, A. & Thurik, R., 2007. Entrepreneurship and its determinants in a cross-country setting. *Journal of Evolutionary Economics*, 17(2), pp.117–131.

Fritsch, M., Kritikos, A. & Pijnenburg, K., 2015. Business cycles, unemployment and entrepreneurial entry—evidence from Germany. *International Entrepreneurship and Management Journal,* 11(2), pp.267-286.

Gartner, W. B. 1985. *Handbook of entrepreneurial dynamics*: *the process of business creation*. Thousand Oaks: Sage, c2004, xxvii, 575 p. ISBN 07-619-2758-1.

Giannetti, M. & Simonov, A., 2004. On the determinants of entrepreneurial activity: Social norms, economic environment and individual characteristics. *Swedish Economic Policy Review*.

Granger, C., 1969. Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*.

Grilo, I. & Thurik, R., 2004. Determinants of Entrepreneurship in Europe. *ERIM Report Series*, (Reference No. ERS-2004-106-ORG).

Grilo, I. & Thurik, R., 2008. Determinants of entrepreneurial engagement levels in Europe and the US. *Industrial and Corporate Change*.

Johnson, P. S., Parker, S. C., & Wijbenga, F. 2006. Nascent entrepreneurship research: achievements and opportunities. *Small Business Economics*, *27*(1), 1-4.

Karlsson, Ch., B. Johannisson & D. Storey. 1993. *Small business dynamics: international, national, and regional perpectives*. New York: Routledge, 1993, xiv, 249 p. ISBN 0415096251.

Klapper, L., Love, I. and Randall, D., 2015. New firm registration and the business cycle. *International Entrepreneurship and Management Journal*,*11*(2), pp.287-306.

Koellinger, P.D. & Roy Thurik, A., 2012. Entrepreneurship and the Business Cycle. *Review of Economics and Statistics*, 94(4), pp.1143–1156.

Leitao, J., Lasch, F. & Thurik, R., 2011. Globalisation, entrepreneurship and regional environment. *International Journal of Entrepreneurship and Small Business*.

Llopis, J.A.S., Millán, J.M., Baptista, R., Burke, A., Parker, S.C. and Thurik, R., 2015. Good times, bad times: entrepreneurship and the business cycle. *International Entrepreneurship and Management Journal*, *11*(2), pp.243-251.

Lukeš, M., Jakl, M., & Zouhar, J. 2014. Global Entrepreneurship Monitor 2013 for the Czech Republic. *Podnikatelská aktivita v České republice*. Available at: http://www.mpo.cz/dokument149362.html.

Menčlová, B. 2014. Economic Development and Number of Business Entities. *Český finanční a účetní časopis*, *2014*(4), (pp. 166-174).

Sandberg, W. & Hofer, C., 1988. Improving new venture performance: The role of strategy, industry structure, and the entrepreneur. *Journal of Business venturing*, 2(1), pp.5–28.

Sanders, M., 2007. Scientific Paradigms, Entrepreneurial Opportunities and Cycles in Economic Growth. *Small Business Economics*, 28(4), pp.339–354.

Stuart, T.E. & Sorenson, O., 2003. Liquidity Events and the Geographic Distribution of Entrepreneurial Activity. *Administrative Science Quarterly*, 48(2), p.175.

Strýčková, L., 2015. Factors determining the corporate capital structure in the Czech Republic from the perspective of business entities. *E+M Ekonomie a Management*, (2), pp.40–56.

Thurik, A., 1995. *Small firms, entrepreneurship and economic growth.* Tinbergen Institute.

[1] Van Gelderen, M., Thurik, R., & Bosma, N. 2006. Success and risk factors in the pre-startup phase. *Small Business Economics*, *26*(4), 319-335.

Van Praag, C. M., Versloot, P. H. 2007. What is the value of entrepreneurship? A review of recent research. *Small business economics*, *29*(4), (pp. 351-382).

Verbeek, M. *A guide to modern econometrics*. 4th ed. Chichester: Wiley, 2012, xv, 497 p. ISBN 978-1-119-95167-4.

Wennekers, S. et al., 2005. Nascent Entrepreneurship and the Level of Economic Development. *Small Business Economics*, 24(3), pp.293–309.

World Economic Forum. 2016. *Global Competitiveness Report* [online]. [cit. 2016-04-22].http://www3.weforum.org/docs/gcr/20152016/Global_Competitiveness_Report_2015-2016.pdf.

9. Annex No. 2 - Review of Empirical Studies on Self-Employment out of Unemployment: Do Self-Employment Policies Make a Positive Impact?[15]

Abstract

The role of self-employment policies as a way out of unemployment has been challenged. Shane (2009) stated that incentives for starting low growth companies should be eliminated as they attract the worst entrepreneurs. However, scientific evidence analysing outcomes of self-employment policies is, with the exception of Germany, scarce. We review 18 empirical studies published in the past ten years that focus on self-employment out of unemployment and summarize the applied approach, used data, variables, control groups and reported findings. Most studies find positive effects of self-employment policies on employment status and personal income of former unemployed individuals and increased survival rates of subsidized businesses. On the other hand, subsidized businesses underperform regular ones. We emphasize that growth cannot be taken as an all-embracing policy goal. There are other goals such as maintaining work-related skills. We suggest avenues for future research and policy recommendations including comparison of effects of various active labour market policies and taking into account local conditions.

9.1. Introduction

Scholars investigating the relationship between the economic performance of the country and entrepreneurship are in consensus, that entrepreneurship plays an important and contributing role in the country´s economic development (e. g. Carree and Thurik, 2010; Klapper et al., 2015 or Dvouletý and Mareš, 2016a). Policy makers shape the business environment not only with the legislation framework, but they also actively support new and existing business entities through various entrepreneurship policies (Minniti, 2008). These can be defined as "policy measures taken to stimulate entrepreneurship that are aimed at the pre-start, the start-up and post-start-up phases of the entrepreneurial process." (Stevenson and Lundström, 2001, p. 23). Entrepreneurship policies utilise loans, soft-loans on investments, guarantees, government equity, non-repayable grants, interest rate grants, incentives, tax deductions, entrepreneurial trainings or capital transfers to current or future entrepreneurs (Pergelova and Angulo-Ruiz, 2014). Because of many types of policies, it is important to clearly categorize them and set up clear goals for them with respect to the local entrepreneurial ecosystems (Terjesen et al., 2016).

Positive outcomes of policies focused on self-employment were however strongly criticised by Shane (2009) who concluded that supported businesses ran by formerly unemployed are marginal, describing them as wage substitutes, having little impact on economic performance and overall employment. He even suggested that these policies attract the worst entrepreneurs. Similar arguments are given by Mason and Brown (2013) who comment on the importance of aiming entrepreneurship policies towards high-potential new ventures that may increase employment, create new jobs and bring desired economic growth. In line with these arguments, there is a visible shift in entrepreneurship policies towards identification and support of "gazelles" and "unicorns" – highly scalable start-ups with global ambition that became a focus of policy-makers' dreams (Autio, and Rannikko, 2016; Henrekson and Johansson, 2010; Council of the European Union, 2010).

On the other hand, one can perceive 1) the increased role of self-employed professionals in the society of 21st century (Burke, 2015) and 2) that unemployment,

especially youth unemployment and long-term unemployment, becomes a significant issue in many European countries and has many negative economic and social outcomes (Jones et al., 2015; Eurofound, 2012; Mroz and Savage, 2006). Congregado et al. (2010) found that the number of self-employed goes up during recession and self-employment thus serves as a way out of unemployment. Current entrepreneurship scholars continue in empirical investigations of the relationship between entrepreneurship and business cycle to support Congregado et al.'s findings across countries (e. g. Cueto et al., 2015; Fritsch et al., 2015 or Dvouletý and Mareš, 2016b). Evidence from the analysis of European Commission Household Pavel (Román et al., 2013) shows that start-up incentives increase the likelihood to become self-employed out of unemployment.

Therefore, some countries apply, as a part of active labour market policies (ALMPs) [16], specific self-employment policies (Månsson and Delander, 2011; Eurofound, 2016) that can be defined as government programmes that support unemployed individuals to enter self-employment. Self-employment policies have the potential of "double dividend", because once unemployed receive the capital grant and establish their own business, they are out of unemployment and may also create new jobs from their own enterprise and further reduce the unemployment rate. These positive spillover effects may lead to lower unemployment rate, indicating higher aggregated demand and result in higher economic growth (Caliendo and Künn, 2014).

Despite the fact that subsidized entrepreneurs are perceived as born out of necessity (Caliendo and Kritikos, 2010) the main purpose of self-employment policies as a part of ALMP may be to maintain employment habits and skills of unemployed during the times of higher unemployment and prevent most endangered groups of individuals on the labour

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[16] Active labour market policies are usually defined as government programmes that intervene in the labour market to help the unemployed find work, e.g., Hörisch et al. (2014).

market from permanent unemployment and loss of further employment opportunities, regardless of the fact that they have often lower levels of education, contacts, skills and lack of experience and knowledge, compared to regular entrepreneurs (Congregado et al., 2010; Niefert, 2010).

Twenty years ago, Meager (1996) created a literature review summarizing empirical findings from Denmark, France, West Germany, United Kingdom and United States and concluded, that evidence obtained by him does not present a conclusive assessment of the overall effectiveness of self-employment programmes. A new report by the European Foundation for the Improvement of Living and Working Conditions (2016) focuses specifically on youth programmes and discusses three empirical studies evaluating youth entrepreneurship programmes. Authors conclude that the more sophisticated the approach that is used in the evaluation, the lower is the found effect of the policy. Results differed across the implemented methodology. More effort needs to be put into efficiency analysis and quantification of deadweight loss. Only partially promising and mixed results were also reported in the most recently published review of empirical studies investigating outcomes of youth ALMP by Caliendo and Schmidl (2016).

This review aims to identify and analyse empirical studies published in the past ten years that deal with the issue of self-employment out of unemployment, with a special focus on evaluation of respective start-up support policies. The increasing role and spread of econometric tools necessary for evaluation of self-employment programmes allow us to present the findings of eighteen published studies that are based on data from France, Germany, Poland, Romania, Spain and Sweden to enrich academia with the knowledge regarding their applied data, methodology, procedures and findings. Another purpose of this study is to encourage national teams to conduct empirical counterfactual evaluations with respect to the national and regional conditions (Preuss, 2011), sharing their experience and forming the best policy practices as highlighted by Atherton and Price (2008). Besides the research community, the outputs of this review are interesting also for policy makers and governmental authorities.

The upcoming section describes the selection of papers listed in the review. The subsequent review of empirical studies is divided into two subsections, the first presenting a summary of research designs, variables, methods and control groups and the second presenting empirical results of the analysed studies. Policy recommendations based on the outcomes from the review are then formed together with suggestions for future research. The final part concludes and summarizes the obtained findings.

9.2. Selection of Articles

Systematic reviews are important, because they provide empirical researchers with strategies for future research based on the analysed literature (Ginsberg, and Venkatraman, 1985). The articles selected for the review were searched through the databases Web of Science (WoS) and Scopus with a condition to be published in the past ten years to ensure time relevancy of presented outcomes. Search strategy was based on one of the following keywords:

Unemployed subsidies entrepreneurship, unemployment policy entrepreneurship, unemployment business policy, active labour market policy start up, start up subsidies unemployment, enterprise subsidy unemployment; enterprise policy unemployed, new business programme unemployment, new business formation unemployed, self-employment programme.

A broad search revealed 446 articles listed in WoS and 508 articles listed in the Scopus database. These articles have been carefully inspected and also, out of the selected articles, references were taken into account, making a final 18 studies selected for this review, focused on the analysis of self-employment out of unemployment, with a special focus on the impact of self-employment programmes. Out of the selected articles, papers most frequently appeared in *Small Business Economics*, *Oxford Bulletin of Economics and Statistics* and in *International Journal of Manpower*, however the articles were spread in various journals.

One outcome of this searching is the fact, that the majority of researchers dealing with the evaluation of self-employment policies are associated with the Institute for the Study of Labor in Bonn (IZA) and they publish studies focused mainly on evaluations in Germany. A significant research gap is hence perceived within the other European countries.

9.3. Review of Empirical Studies

As already mentioned in the introduction, this review does not only aim to summarize findings of previous studies, but also to provide extensive information about the applied methods, sample sizes and framework that can be implemented by researchers from countries where such evaluations have not taken place so far. Results of the review of eighteen empirical studies are reported in Table 1 below, containing information about authors and year of publication, focus of the study (research question), type of used data (cross-sectional/time series/longitudinal) and details about the collected sample. Additional columns contain information about used variables (both dependent and explanatory), control groups, implemented methods of evaluation and obtained results.

Table 13: Review of empirical studies on self-employment out of unemployment

Authors	Focus of the study	Data	Sample	Dependent Variables	Explanatory Variables	Control Group	Method	Results
Andersson and Wadensjö (2007)	To analyse economic outcomes for unemployed who become self-employed	Longitudinal	1,441,798 men in Sweden for period of years 1998-2002	Income, probability of becoming self-employed	Age, education, marital status, place of residence, being a second-generation immigrant, start-up subsidy	Comparing participants and non-participants with group of employed wage earners	Probit and multinomial logit regression model estimates	The economic outcomes of self-employment were inadequate for many who were unemployed earlier. Unemployed who got a start-up subsidy were doing better than unemployed without a subsidy in different aspects (income, number of employees, exit).
Baumgartner and Caliendo (2008)	To evaluate effectiveness of two ALMP programmes on self-employment	Longitudinal	3,100 individuals in Germany tracked from 2003 to 2006	Employment status (employed, self-employed or unemployed), personal earnings	Gender, age, marital status, number of children, nationality, health restrictions, education, work experience, earnings, unemployment benefits and its duration	Matching unemployed participants and non-participants with propensity score based on covariates	Difference in Differences approach (DID) calculating average treatment effects (ATT) and accumulation of outcomes	22 months after the programme participants had lower unemployment rate and higher personal income compared to non-participants. Better results were observed for men in comparison with women.

Caliendo (2009)	What is the impact of start-up subsidies for unemployed on earnings and unemployment?	Longit udinal	1,300 individual s starting business in Germany 1994-2004	Employment status (employed, self-employed or unemployed), personal earnings	Gender, age, marital status, number of children, nationality, health restrictions, education, work experience, earnings, unemployment benefits and its duration	Matching unemployed participants and non-participants with propensity score based on covariates	DID approach calculating average ATT and accumulation of outcomes	Positive impact of the programme on earnings and employment rates in comparison with control group 22 months after the end of programme. Larger effects on employment status were observed for women, however not for their earnings.
Caliendo and Kritikos (2010)	What is the impact of start-up support programmes for unemployed on earnings, employment status and number of employees according to their characteristics?	Longit udinal	3,100 start ups founded by unemploy ed in Germany from 2003 to 2006	Survival rate, personal income, number of employees	Gender, relationship status, health restrictions, FTE, age, children, experience, education, type of industry, programme, motivation (push and pull)	Comparing participants within the programme according to individual characteristics	Differences quantified using cross-tabulations, t-tests and descriptive statistics	Results showed that the majority of new businesses were solo entrepreneurs, male earnings were higher than before participation in the programme, and survival rate after 2,5 years was 70 %. Bridging allowance had bigger effects than start-up subsidy in terms of jobs created.
Congregado et al. (2010)	To analyse long-term relationship between self-employment, own-account workers and employers in terms of ALMP	Time series	Quarterly data for period 1987-2004 in Spain	Entrepreneurs hip rate, solo entrepreneurs hip rate	Entrepreneurship rate, solo entrepreneurship rate		Vector Error Correction Models (VECM) estimated with maximum likelihood	Authors cannot confirm efficiency of the entrepreneurship policy in Spain, however they argue that the number of solo entrepreneurs finding safer jobs during boom periods is smaller than the supply of new solo entrepreneurs during recessions and argue in favour of self-employment policies in Spain.

Niefert (2010)	To assess the overall economic effects of start-ups from unemployment and to form expectations about this kind of firms.	Longit udinal	877 German individual s over years 2003-2004	Probability of becoming self-employed, probability to have employees	Age, sex, household income, education, residence in eastern Germany, funding, industry, number of employees	Employed persons, unemployed and engaged in business activity	Probit model estimates	Start-ups from unemployment had fewer employees on average and results showed that they were mostly one-man firms. A large proportion of start-ups from unemployment were in less capital-intensive sectors characterized by a high level of competition. Individual unemployment was found to encourage the transition to self-employment.
Rodríguez-Planas (2010)	To evaluate public employment services and small business programmes for unemployed individuals.	Longit udinal	1,311 observatio ns over 2000-2002 in Romania	Employment status (employed, self-employed or unemployed), personal income	Age, gender, education, region, work experience, earnings, unemployment history	Matching unemployed participants and non-participants with propensity score based on covariates	DID approach calculating ATT, estimated separately for age, region and education groups	Participation in the programme, compared to non-participants, led to increased income and reduced probability of becoming unemployed for participants.
Caliendo and Künn (2011)	What is the impact of start-up subsidies for unemployed on employment?	Longit udinal	2,081 individual s participati ng in two programm es during period 2003-2008 in Germany	Employment status (employed, self-employed or unemployed), personal earnings, occupational satisfaction	Age, sex, marital status, number of children, health restriction, education, nationality, work experience, income, previous unemployment	Matching unemployed participants and non-participants with propensity score based on covariates	DID approach calculating ATT and accumulation of outcomes	Both programmes had positive impact on employment status (employed or self-employed) of participants and their income after five years. Participants also were much more satisfied with their occupational situation.

Månsson and Delander (2011)	To evaluate start-up subsidies allocated to unemployed with respect to gender differences	Longit udinal	14,358 participan ts over years 2003-2007 in Sweden	Employment status (employed, self-employed or unemployed)	Age, sex, marital status, education, immigration, experience and business experience, activity in job searching, parents experience, unemployment history	Matching unemployed participants and non-participants with propensity score based on covariates	DID approach calculating ATT	The start-up grant is successful for both females and males as regards employment outcome, however, the result for male participants is significantly better than for females.
Bernat and Korpysa (2013)	To analyse if financial support granted to the unemployed to start business activity is used effectively	Time series	Administr ative data for years 2008-2011 for Poland	Business survival rate, number of employees			Descriptive analysis only	Authors conclude that firms established by the unemployed have effectively used the support they have received since everyone has set up their own firms and over 13% employ more than one person.
Román et al. (2013)	To investigate the determinants of the transition from unemployment to own-account work or employership in Europe with a special focus on the role of social capital, business cycle and labour market regulation.	Longit udinal	25,694 individual s from EC Househol d Panel for years 1994-2001 (EU 15)	Employment status (employed, self-employed or unemployed)	Age, sex, number of children, social capital and networks, relationship status, unemployment benefits, start-up incentives, previous experience, unemployment duration, education, income, country specific variables		Multinomial Logit estimates	Results confirm the existence of different responses of employers and own-account workers to the three key elements within the macro-environment considered in this analysis. In this sense, the coexistence of recession periods, start-up incentives, and strict employment protection increases the likelihood of becoming an own-account worker from unemployment

Caliendo and Künn (2014)	What are the effects of start-up subsidies for unemployed males across German regions with regards to labour market conditions?	Longit udinal	2,427 males from East and West Germany 2003-2008	Employment status (employed, self-employed or unemployed), personal earnings	Regional unemployment rate and productivity (GDP per capita), age, marital status, children, nationality, unemployment benefit level, education, parents employment and education, motivation, capital intensity of subsidy	Matching unemployed participants and non-participants with propensity score based on covariates	DID approach calculating ATT, specific models were estimated for different regional and economic conditions.	Both programmes reported positive impact on employment status and working income, however in some model specifications the results were found to be insignificant. Positive coefficients were observed regardless of age and education of participants.
Caliendo and Künn (2015)	What are effects of start-up subsidies for unemployed females?	Longit udinal	2,466 females in Germany over years 2003-2008	Income, probability of becoming self-employed or employed or on maternity leave	Age, marital status, children, nationality, unemployment benefit level, education, parents employment and education, motivation to become self-employed, capital invested to start-up, household-income	Matching unemployed participants and non-participants with propensity score based on covariates	DID approach calculating ATT	Analysed programmes lead to positive increase of employment chances and increase of working income of participating females. Participation in the programme indicated negative impact on fertility.
Caliendo et al. (2015)	Testing difference between nascent subsidized unemployed entrepreneurs and regular business founders	Cross-section al	2,408 male responden ts from East and West Germany 2009	Survival in self-employment, income, innovation and business growth	Age, nationality, education, children, marital status, previous income, sector of business, unemployment history, subsidy and details about start up	Matching unemployed participants and regular business founders with propensity score based on covariates	Calculation of conditional counterfactual outcome based on PSM and decomposition	Previously unemployed entrepreneurs reported lower entrepreneurial ability and access to capital. 19 months after start-up, the supported enterprises had higher survival rates, but had lower income, business growth and innovation rates compared to regular entrepreneurs.

Duhautois et al. (2015)	To evaluate the effect on firm survival and performance of the programme supporting start-ups created by jobless people	Longit udinal	9,359 observatio ns in France over years 1998-2006	Survival in self-employment, number of employees, value-added, capital productivity, profit rate	Age, nationality, gender, age, education, previous occupation, subsidy size, other source of funding, number of employees, sector of business, dummy for Paris	Matching unemployed participants and non-participants with propensity score based on covariates	DID approach calculating ATT	Results show that the supported entrepreneurs participating in the program have a higher survival rate after their second year of existence compared to non-supported. However supported businesses reported lower economic performance.
Caliendo et al. (2016)	To evaluate start-up subsidies allocated to unemployed.	Longit udinal	1,288 observatio ns in Germany over years 2009-2012	Employment status (employed, self-employed or unemployed), personal income	Age, nationality, education, children, marital status, previous income, sector of business, unemployment history, subsidy and details about start up, big five personality traits, risk aversion	Matching unemployed participants and non-participants with propensity score based on covariates	DID approach calculating ATT	Authors found strong and positive effects of the programme on employment rates and income of participants 40 months after the support, even when taking into account individual personal traits. Authors discuss that personal traits could be controlled by already implemented control variables. Lower outcomes were reported for women.
Wolff et al. (2016)	To evaluate start-up subsidies allocated to unemployed.	Longit udinal	225,847 observatio ns in Germany over years 2005-2011	Probability of non-receiving unemployme nt benefits	Age, nationality, education, marital status, unemployment history	Matching unemployed participants and non-participants with nearest neighbour based on covariates	DID approach calculating ATT	Results of the analysis show positive outcomes both in the short and long run on probability of non-receiving unemployment benefits. Based on qualitative research, several recommendations have been written.

Zouhar and Lukeš (2015)	To explore the role of active and passive labour market policies on nascent entrepreneurship of the unemployed	Cross-sectional cohorts	36,030 unemployed in 33 countries over years 2006-2012	Entrepreneurial state (nascent entrepreneur planning to be solo vs. to employ others vs. non-entrepreneur)	Individual level (gender, education, age) and country level (GDP per capita, unemployment rates, expenditures on active and passive LMP)		Multinomial logit and fixed effects regressions	Unemployment benefits decrease nascent solo entrepreneurship. Positive influence of active labour market policies on entrepreneurial activity that plans to employ other people was found.

9.3.1. Review of Research Designs, Variables, Methods and Control Groups

Out of eighteen selected articles, fourteen studies were based on longitudinal/panel data sets which may be considered as an optimistic finding, allowing to analyse the outcomes of individuals over time and accounting for their heterogeneous personal and demographic characteristics. The best practise during the data collection process, based on the analysed studies, consists of a combination of administrative data with collection of own survey data through personal, electronic or phone interviews. Unfortunately, studies using other data types (cross-sectional/time series) commonly come from countries, where the evidence related to the outcomes of self-employment policies is still relatively scarce (e.g., Poland, Spain). However, it is important to point out that even aggregated data could bring an initial insight into the outcomes of policies, especially in countries, where no evaluations have been conducted so far, and one should welcome such initiatives as a good starting point for further investigations.

Fundamental outcome variables are in line with the main purpose of self-employment policies and captures the survival rate of subsidized enterprises or the employment status of supported individuals. Other frequently used dependent variables include earnings of self-employed/unemployed and the number of employees in supported new firms. Inspiring dependent variables for future research may be occupational satisfaction (Caliendo and Künn, 2011), productivity (Duhautois et al., 2015) or level of innovation (Caliendo et al., 2015).

The methodological approach commonly starts with the descriptive analysis of the outcome variables with respect to the treated (subsidized) and control group consisting most frequently of other unemployed (non-subsidized) individuals. A more demanding approach, at least for the data collection, implemented for example in the studies of Niefert (2010) or Caliendo et al. (2015), assesses the outcomes of the programmes compared to regular employees or regular business founders. What has not been, according to our knowledge, analysed so far, is the comparison of cost/benefit effects of self-employment policies vs. other active labour market policies, such as training, employment incentives, or direct job creation, on long-term employment and job creation.

Availability of longitudinal data further determines, whether more sophisticated econometric techniques may be implemented. If so, treated and non-treated individuals are then matched under the conditional independence assumption (CIA) with matching techniques (propensity score matching – PSM, kernel matching or nearest neighbour matching) based on the selection of covariates (mainly demographic characteristics; e.g. age, gender, nationality, education, work experience and unemployment history). Finally the average treatment effect (ATT) is calculated econometrically, following the difference in differences approach. Comparison of the results of different matching and estimation techniques is highly recommended (Bondonio, 2009). This approach was implemented in eleven out of the eighteen analysed studies.

Another important step in the already demanding analysis is to track programme participants over time. Evaluation needs to be conducted once the recipients stop receiving financial support, otherwise the results would be biased due to some positive ongoing effects caused by the last subsidy payments, having potential impact on business survival (Caliendo et al., 2015). Such correct approach can be observed in the majority of studies working with the longitudinal data, especially in the most recently published studies (Caliendo et al., 2016; Duhautois et al., 2015; Wolff et al., 2016). On the other hand, in the studies based on cross-sectional data (e.g., Bernat and Korpysa, 2013), the strength of reported results may decrease. The length of the subsequent follow up could be expressed by the words "the longer, the better", since it is important to distinguish between the short term and long term effects of the programme. Outcomes are commonly analysed right after the end of payments (after a couple of months) and, if the research design and resources allow, every year after the participation in the programme. Reported results may differ according to the time lag, after which the outcomes are observed. Researchers therefore report results for multiple lags, but the very common length of observation is around two years used for example in the studies written by Baumgartner and Caliendo (2008) or Caliendo and Kritikos (2010) and may increase up to five years (Duhautois et al., 2015).

9.3.2. Review of Empirical Results

Obtained results of introduced studies are generally in agreement regarding the positive outcomes of the self-employment programmes on the employment status (Månson and Delander, 2011; Wolff et al., 2016) and earnings of previously unemployed participants compared to the control group of unemployed who did not receive start-up subsidies (e.g., Andersson and Wadensjö, 2007; Baumgartner and Caliendo, 2008; Rodríguez-Planas, 2010; Caliendo and Kühn, 2011). However, when compared to wage earners, previously unemployed individuals achieve, in line with Shane's (2009) argument, rather inadequate economic outcomes (e.g., Andersson, and Wadensjö, 2007). Most of them remain solo entrepreneurs (Caliendo, and Kritikos, 2010) who operate in less capital intensive and highly competitive sectors and underperform when compared with regular businesses (Niefert, 2010; Duhautois et al., 2015), e.g. in terms of income, growth and innovation (Caliendo et al., 2015). They however showed higher survival rates than regular businesses (Caliendo et al., 2015; Duhautois et al., 2015). This effect may be explained by lower employability and thus missing alternative opportunities (cf. Lukeš and Zouhar, 2016).

One extension is to investigate the varying impact of the programmes according to the age groups, education level, region and gender. Such a study may reveal the differences in the outcomes of the self-employment programmes across the selected groups and may have a value for policy makers, delivering information about the most benefiting group of participants and also about the group facing the lowest outcomes of the programme. Most studies found better effects for men (Baumgartner and Caliendo, 2008; Månson, and Delander, 2011; Caliendo et al., 2016), however Caliendo (2009) reported better results regarding decrease of unemployment rate for women participants. Caliendo and Kühn (2014, 2015) found that start-up subsidies increased employment likelihood and working income for women significantly whereas for men these effects were insignificant. Overall, gender related effects are not conclusive.

Differences in implemented programmes with respect to the size of the grant allow researchers to compare outcomes according to the intensity of subsidy and to observe whether the more capital intensive programmes deliver better outcomes (Caliendo and Kritikos, 2010).

Caliendo and colleagues tested in a variety of studies the effect of two forms of support – bridging allowance and start-up-subsidies, usually confirming the positive effect of both forms (Caliendo and Kritikos, 2010; Caliendo and Künn, 2011). And finally, a recommendable option would be to compare the outcomes of the self-employment programme with the outcomes of other ALMPs. Such evaluation would lead to evidence based recommendations for increasing or decreasing the share of self-employment policies in the mix of ALMPs.

9.4. Implications for Policy and Future Research

First, we start with policy recommendations. The cornerstone of the evaluation process is the *strong cooperation between the research community and public sector institutions* as can be seen from outputs of presented studies. Counterfactual analysis requires substantial, structured and detailed data about participants of assessed programmes and members of a control group. In addition, the evaluation team is demanded to have strong econometric skills, scientific background and information about the regional labour market conditions. Empirical practise shows that officers of public authorities are not very often equipped with those needed skills. Therefore, national public authorities should create, develop and support evaluation teams at research institutions that are capable to conduct counterfactual analysis despite the fact that self-employment policies are often only a small part of the whole system of ALMP. We call for larger availability of anonymized data researchers might work with. The access to data is nowadays very limited.

Furthermore, *cost-benefit analysis* needs to become a part of the evaluation process, informing policy makers and stakeholders about the costs per one created job (unit of analysis), preferably in the long run, compared to the alternative of paying unemployment benefits, direct job subsidies or other comparable indicators. This fundamental step, often based on descriptive evidence, would serve as a supportive argument for efficiency discussions, which is still considered as a challenge of these evaluations (Duhautois et al., 2015). The risk lies in the potential clash between research based evidence and political decisions often motivated by other than efficiency factors.

Assessing separately *different groups of individuals* according to their gender, age, education or place of living would help in the continuous development of knowledge about the

outcomes for different groups (Preuss, 2011), which may further lead to better targeting of self-employment policies (Rodríguez-Planas, 2010). Previous research also does not bring answers to the *amount of resources* that should be allocated to unemployed through subsidy and leaves this question for empirical experiments of national evaluators and research teams. Such a process of optimization covering different schemes of subsidies would also lead to increased efficiency of implemented policy.

Shane (2009) pointed out that encouraging more people into entrepreneurship is bad public policy. Results of this review also show that we cannot really expect the creation of high growth enterprises and new jobs by former unemployed. However, it does not mean that policies supporting self-employment out of unemployment are bad. Rather, both scholars and policy makers should *review the original purpose of self-employment policies*. If the main purpose of self-employment policy is to maintain employment habits and skills of unemployed, especially during times of higher unemployment (Caliendo and Kritikos, 2010), then it looks that the policies fulfill this task well. More attention should therefore be put towards the differences among growth-oriented entrepreneurship policies on the one hand and active labour market policies and their outcomes on the other hand (Terjesen et al., 2016). Careful distinction would provide policy makers overview and guidelines for realistic expectations and future policy adjustments.

Coordination of different entrepreneurship and active labour market policies would complementarily bring higher outcomes for supported individuals. The most frequently investigated German experience combines the self-employment financial support with the additional subsidy called "bridging allowance" that supports formerly subsidized self-employed who ran into troubles, once they are on their own, and brings them resources to cover operational costs (Wolf et al., 2016). Supported self-employed would also benefit from the further development of their knowledge and skills through the system of entrepreneurial trainings and coaching sessions potentially leading to increased survival rates of subsidized businesses (Oberschachtsiek and Scioch, 2015). Finally, careful *piloting* of individual policies and / or their mix is needed in order to be able to evaluate them empirically and decide whether to abandon, modify or strengthen them before the full launch.

Future research should work more on the assessment of economic efficiency of self-employment policies, develop evaluation indicators and enrich empirical reports with a cost benefit analysis. The comparisons should be made especially between unemployed individuals who received support from different ALMP programmes, i.e. to compare in the long run those who received start-up subsidy with those who were supported through training, employment incentives or other forms. Employment status, job stability and earnings would then be the most recommended outcome variables.

Another potential of future counterfactual analysis is to integrate into evaluation established entrepreneurs and ordinary employees as an additional control group. Continuous assessment of the outcomes on various groups of individuals with respect to their gender, age or education is also welcome, as well as the investigation of the differences in the outcomes after the allocation of various intensity of financial subsidies or other forms of support. More outcome variables apart from employment status, earnings and survival rate should be considered too, such as occupational satisfaction (Caliendo, and Künn, 2011), social capital or self-efficacy. However, variables such as the level of innovation (Caliendo et al., 2015) imply rather growth oriented entrepreneurship outcomes that, on average, cannot be expected from previously unemployed individuals. Supplementary arguments for the debate started by Shane (2009) could be brought, once researchers attach to their studies outcome variables measuring entrepreneurial growth, such as turnover, profit or number of employees. We however perceive these variables as more appropriate for studying the effects of growth-oriented entrepreneurship policies (Autio and Rannikko, 2016). For studying the effects of self-employment policies (as a part of ALMP), the programme is effective if it increases employment status, employability and human capital of participants (Månsson and Delander, 2011).

9.5. Conclusions

Building upon the contribution of Meager (1996) who created a literature review of the studies analysing the outcomes of self-employment policies resulting in non-conclusive outcomes, we reviewed empirical studies published in the past ten years. Eighteen studies focusing on the issue of self-employment out of unemployment -mainly in Germany, but also in France, Poland, Romania, Spain, Sweden and OECD countries- were presented in the form of a

structured review, containing information about the year of publication, focus of the study, structure of the data, used sample, applied methods, collected variables and main findings.

Depending on the selected variable indicating the effect of self-employment policy, authors based their interpretations of the particular policy success. Consensus was found in the positive results for staying in (self-) employment status and personal income when compared with unemployed individuals not participating in the programme. When compared with regular businesses, subsidized enterprises had a higher survival rate, but grew less and underperformed regular business also in most other criteria. We need to point out, that the majority of studies share a German background and that most countries have not been investigated so far. Therefore, more empirical studies, especially from under-researched countries, are needed for understanding the effects of self-employment policies better and in particular national contexts. One purpose of this review was therefore to provide empirical methodology for researchers from countries that have not been investigated so far and to encourage national teams to join the scientific debate. Several recommendations for policy makers, such as highlighting the importance of cooperation between academia and public authorities, policy efficiency evaluation, the role of regional/national conditions and coordination of various entrepreneurial policies were mentioned in the text. Overall, we conclude that self-employment policies fit well into the mix of active labour market policies and countries omitting them should take them into consideration. On the other hand, they should be distinguished from growth oriented entrepreneurship policies.

9.6. References

Andersson, P., & Wadensjö, E. (2007), "Do the unemployed become successful entrepreneurs?", *International Journal of Manpower*, *28*(7), 604–626.

Atherton, A., & Price, L. (2008), "Can experiential knowledge and localised learning in start-up policy and practice be transferred between regions? The case of the START network", *Entrepreneurship and Regional Development*, *20*(4), 367-385.

Autio, E., & Rannikko, H. (2016), "Retaining winners: Can policy boost high-growth entrepreneurship?", *Research Policy,* 45, 42–55.

Baumgartner, H.J., & Caliendo, M. (2008), "Turning unemployment into self-employment: effectiveness of two start-up programmes", *Oxford Bulletin of Economics and Statistics*, *70*(3), 347–373.

Bernat, T., & Korpysa, J. (2013), "Setting up new firms as an opportunity to reduce unemployment", *Transformation in Business & Economics*, *12*(1A), 381-397.

Bondonio, D. (2009), "Impact identification strategies for evaluating business incentive programs", *POLIS Working Paper 145*, Università del Piemonte Orientale.

Burke, A. (ed.) (2015), *The Handbook of Research on Freelancing and Self-employment*, Dublin: Senate Hall.

Caliendo, M. (2009), "Start-up subsidies in East Germany: Finally, a policy that works?", *International Journal of Manpower*, *30*(7), 625–647.

Caliendo, M., Hogenacker, J., Künn, S., & Wießner, F. (2015), "Subsidized start-ups out of unemployment: A comparison to regular business start-ups", *Small Business Economics*, *45*(1), 165–190.

Caliendo, M., & Kritikos, A.S. (2010), "Start-ups by the unemployed: Characteristics, survival and direct employment effects", *Small Business Economics*, *35*(1), 71–92.

Caliendo, M., & Künn, S. (2011), "Start-up subsidies for the unemployed: Long-term evidence and effect heterogeneity", *Journal of Public Economics*, *95*(3), 311–331.

Caliendo, M., & Künn, S. (2014), "Regional effect heterogeneity of start-up subsidies for the unemployed", *Regional Studies*, *48*(6), 1108–1134.

Caliendo, M., & Künn, S. (2015), "Getting back into the labor market: The effects of start-up subsidies for unemployed females", *Journal of Population Economics*, *28*(4), 1005–1043.

Caliendo, M., Künn, S., & Weißenberger, M. (2016), "Personality traits and the evaluation of start-up subsidies", *European Economic Review*, *86*, 87–108.

Caliendo, M., & Schmidl, R. (2016), "Youth unemployment and active labor market policies in Europe", *IZA Journal of Labor Policy*, *5*, article 1.

Carree, M.A., & Thurik, A.R. (2010), "The impact of entrepreneurship on economic growth", In: Z.J. Acs and D.B. Audretsch, *Handbook of Entrepreneurship Research* (pp. 557-594), New York: Springer.

Congregado, E., Golpe, A.A., & Carmona, M. (2010), "Is it a good policy to promote self-employment for job creation? Evidence from Spain", *Journal of Policy Modeling*, *32*(6), 828–842.

Council of the European Union (2010), *Conclusions on Innovation Union for Europe*. 3049th

Competitiveness Council meeting, Brussels, 26 November 2010.

Cueto, B., Mayor, M., & Suárez, P. (2015), "Entrepreneurship and unemployment in Spain: A regional analysis", *Applied Economics Letters*, 22(15), 1230-1235.

Duhautois, R., Redor, D., & Desiage, L. (2015), "Long term effect of public subsidies on start-up survival and economic performance: An empirical study with French data", *Revue D'économie Industrielle*, *149*(1), 11–41.

Dvouletý, O., & Mareš, J. (2016a), "Determinants of regional entrepreneurial activity in the Czech Republic", *Economic Studies & Analyses/Acta VSFS*, 10(1), 31-46.

Dvouletý, O., & Mareš, J. (2016b), "Relationship between unemployment and entrepreneurial activity: Evidence found among Visegrad countries", In: *Proceedings of the 4th International Conference: Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS),* University of Economics in Prague.

Eurofound (2012), *NEETs – Young people not in employment, education or training: Characteristics, costs and policy responses in Europe*, Publications Office of the European Union, Luxembourg.

Eurofound (2016), *Start-up support for young people in the EU: From implementation to evaluation*, Publications Office of the European Union, Luxembourg.

Fritsch, M., Kritikos, A., & Pijnenburg, K. (2015), "Business cycles, unemployment and entrepreneurial entry - Evidence from Germany", *International Entrepreneurship and Management Journal*, 11(2), 267-286.

Ginsberg, A., & Venkatraman, N. (1985), "Contingency perspectives of organizational strategy: A critical review of the empirical research", *Academy of Management Review*, *10*(3), 421-434.

Henrekson, M., & Johansson, D. (2010), "Gazelles as job creators: a survey and interpretation of the evidence", *Small Business Economics,* 35, 227–244.

Hörisch, F., Shore, J., Tosun, J., & Werner, C. (2014), *Labour market policies and youth unemployment*. CUPESSE Policy brief I (University of Mannheim).

Jones, K., Brinkley, I., & Crowley, L. (2015), *Going solo: Does self-employment offer a solution to youth unemployment?*, London: The Work Foundation (Lancaster University).

Klapper, L., Love, I., & Randall, D. (2015), "New firm registration and the business cycle", *International Entrepreneurship and Management Journal*, *11*(2), 287-306.

Lukeš, M., & Zouhar, J. (2016), "The causes of early-stage entrepreneurial discontinuance", *Prague Economic Papers,* 25(1), 19–36.

Månsson, J., & Delander, L. (2011), "Gender differences in active labour market policy: The Swedish self-employment programme", *Equality, Diversity and Inclusion: An International Journal*, *30*(4), 278–296.

Mason, C., & Brown, R. (2013), "Creating good public policy to support high-growth firms", *Small Business Economics*, *40*(2), 211–225.

Meager, N. (1996), "From unemployment to self-employment: Labour market policies for business start-up". In: G. Schmid, J. O'Reilly and K. Schömann (eds.), *International Handbook*

of Labour Market Policy and Evaluation (pp. 489–519), Cheltenham, UK: Edward Elgar Publishing.

Minniti, M. (2008), "The role of government policy on entrepreneurial activity: Productive, unproductive, or destructive?", *Entrepreneurship Theory and Practice*, *32*(5), 779-790.

Mroz, T.A., & Savage, T.H. (2006), "The long-term effects of youth unemployment", *Journal of Human Resources*, 41(2), 259–293.

Niefert, M. (2010), "Characteristics and determinants of start-ups from unemployment: Evidence from German micro data", *Journal of Small Business & Entrepreneurship*, *23*(3), 409–429.

Oberschachtsiek, D., & Scioch, P. (2015), "The outcome of coaching and training for self-employment. A statistical evaluation of outside assistance support programs for unemployed business founders in Germany", *Journal for Labour Market Research*, *48*(1), 1-25.

Pergelova, A., & Angulo-Ruiz, F. (2014), "The impact of government financial support on the performance of new firms: The role of competitive advantage as an intermediate outcome", *Entrepreneurship & Regional Development*, *26*(9-10), 663–705.

Preuss, L. (2011), "On the contribution of public procurement to entrepreneurship and small business policy", *Entrepreneurship & Regional Development*, *23*(9-10), 787–814.

Rodríguez-Planas, N. (2010), "Channels through which public employment services and small business assistance programmes work", *Oxford Bulletin of Economics and Statistics*, *72*(4), 458–485.

Román, C., Congregado, E., & Millán, J.M. (2013), "Start-up incentives: Entrepreneurship policy or active labour market programme?", *Journal of Business Venturing*, *28*(1), 151–175.

Shane, S. (2009), "Why encouraging more people to become entrepreneurs is bad public policy", *Small Business Economics*, 33(2), 141–149.

Stevenson, L., & Lundström, A. (2001), *Patterns and Trends in Entrepreneurship / SME Policy and Practice in Ten Economies*, Stockholm: Swedish Foundation for Small Business Research.

Terjesen, S., Bosma, N., & Stam, E. (2016), "Advancing public policy for high-growth, female, and social entrepreneurs", *Public Administration Review, 76*(2), 230-239.

Wolff, J., Nivorozhkin, A., & Bernhard, S. (2016), "You can go your own way! The long-term effectiveness of a self-employment programme for welfare recipients in Germany", *International Journal of Social Welfare*, *25*(2), 136–148.

Zouhar, J, & Lukeš, M. (2015), "Factors influencing nascent entrepreneurship of the unemployed: The role of labor market policies", *Academy of Management Proceedings, 2015*(1), 18476